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SCARLATINA STATISTICS

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Dedication.

TO THE MEMBERS
OF THE
AMERICAN PUBLIC HEALTH ASSOCIATION.



Scarlet Fever in the United States.

*A Study of the Mortality Statistics of the Ninth
Census, including an inquiry as to the
seeming effect of Geographical Position,
Temperature, and Altitude
on the Disease.*

By THOMAS C. MINOR, M.D.,
CINCINNATI, OHIO.

“ Rien n'a été plus vivement contesté que l'utilité de la statistique dans les sciences médicales. . . . Parmi les médecins les uns suivent docilement les leçons de leurs prédécesseurs et les autres tentant aventureusement des voies nouvelles. . . . Tous en générale, font de la statistique, mais les uns confient leurs résultats à la mémoire les autres au papier.”
QUETELET.

SYNONYMS.—Scarlet Fever, Rash Fever (English); Fievre Rouge, Searlatine (French); Scharlach fieber, Scharlach aufschlag (German); Scarlatina (Italian); Escarlatina (Spanish). Also, Gut-turus morbus epidemicus Foresti; Exanthesis Rosalia; Scarlata; Febris scarlatina; Morbilli confluentes; Rubcola rossallia; Febris rubra; Febris miliaris rubra et maligna; Febris anginosa miliaris.

Fevers of some kind prevail at times in all known parts of the universe. These fevers vary as regards type. They may be contagious or non-contagious, or yet again infectious. They may

depend on known or unknown causes. They may be modified by certain influences, such as temperature, altitude, or telluro-atmospheric conditions. They may prevail as epidemics, endemics, or yet again sporadically. Thus we know that typhus fever and yellow fever differ in type; that typhoid fever is contagious, while intermittent fever is non-contagious; that some forms of exanthematous fevers are dependent on a specific poison, capable of being reproduced by inoculation, while various forms of ephemeral fever are dependent on no known cause. We know that a low temperature and yellow fever together is a thing impossible; that a residence beyond certain altitudes produces anæmia, or, as sometimes occurs in Mexico, a tendency toward meningitis; that cretinism and goitre flourish over calcareous magnesian formations; that a high temperature, with stagnant water and a great amount of decaying vegetation, tends to produce malarial fevers.

A celebrated writer remarks: "Civilization has diminished the frequency and intensity of epidemics." This remark may be true as regards the dreaded plague, the Irish typhus, and the scurvy once so common. The application of discovered remedies has caused the almost total disappearance of many diseases that during the middle ages carried death and destruction to thousands. Thus, Jenner's discovery of vaccination as a preventive of variola; the discovery of Le Fevre that the "Dry Colic" was dependent on lead-poisoning; the discovery that mercury was the specific against the Neapolitan plague; the discovery that vegetables and limes would prevent scurvy; that the drainage of swamps would drive away intermittents, etc. In the meantime, a disease which annually carries off its myriads of victims, in place of *diminishing, has become, if anything, more prevalent*. I allude to *scarlatina*. There is reason to believe that if the adult population had been always equal sufferers with the infantile population from the disease, that long before this time preventive medicine would have greatly decreased the mortality from this scourge.

It is by the constant study of a disease that we become more fully acquainted with its habits, so to speak. In this way we learn to anticipate its movements, to know what agrees with it, and what disagrees with it. No better way to study a disease, then, than from a large number of cases, widely scattered and subject to many different influences. It is the writer's intention in this paper to study the statistics of scarlet fever in the United States, as shown by the census of 1870.

Since the English astronomer, Halley, in the year 1693, constructed the first mortality tables, the study of vital statistics has become wide-spread, and its importance can not be overestimated. In the meantime, there are medical men who contend that the conclusions drawn from medical statistics are valueless, and this notwithstanding the fact that many of the best established physiological, pathological, and therapeutical discoveries of modern times are based exclusively upon the study of such statistics. Intricate and difficult medical problems have been solved, and subjects once hidden under the heavy veil of theory have become demonstrable facts, simply through the careful analysis of that which, at a first glance, may have seemed to be but a chaotic mass of meaningless figures.

In therapeutics, every new remedy must have been used in a certain number of cases before its absolute properties can be determined. In pathology, the lesion most characteristic of any form of disease must be demonstrated in the dead-room in a certain number of cases, before it becomes an accepted truth to the pathologist. In physiology, all experiments must be repeated in a number of cases, before they can be regarded as of any definite value. In surgery, it is a notorious fact that the most commonly performed operations are those which show the lowest percentage of mortality; the difference of pulse rate and respiration in infancy and old age, and in the different sexes; the age of puberty and primary ovulation, as modified by race and climate; the influence of climate on fecundity; the fact that early marriage produces sterility and short-lived children; that libertinage begets sterility; that free institutions and virtuous habits beget fecundity; that natural causes, such as sex, age, season, hour of the day, etc., react on mankind: thus we see that the majority of births occur at night; of deaths in the early part of the day; that the death rate at different ages varies; that some occupations and professions are more healthy than others; that climate influences physical development; that climate influences some diseases: thus we know that at certain latitudes and altitudes intermittent and yellow fever never occur; that cholera is never seen in Iceland, Siberia, Greenland, or Australia; that phthisis is never seen in Iceland, and only rarely in Norway, Madras, or the elevated plains or pampas of Mexico. These, and innumerable other important facts, are based almost solely on the study of statistics. In the face of such evidence it requires more than ordinary *assumption* to declare that

vital statistics are valueless, and that the life-long labors of such men as Malthus, Bicker, Hofacker, Hawkins, Benoiston, Villerme, Sadler, Sussmilch, Guiette—names so frequently mentioned by Quetelet,* to whose superb work I am indebted for many valuable statistical facts—have amounted to nothing. As well might it be claimed that the statistical researches and investigations of Boudin, Armand, Rochard, Rey, Johnston, Duncan, Kennedy, Simpson, Tulloch, and in our own country, of Walker, Smith, Harris, and Snow, have been useless. In the analysis of the scarlatina statistics of 1870 that follows, it is not likely that any great amount of light will be thrown on the subject. Nevertheless, if there be only a few new points discovered, the writer will be satisfied and more than repaid for his labor. Asking the critical reader, if he doubts any conclusion arrived at, to simply go over the same ground in the same manner, and see whether or no our deductions be identical, I now enter into the study of the subject, first, however, by way of introduction, giving a short historical sketch of the disease, together with its geographical distribution over the surface of the globe.

HISTORICAL.—There seems to be much doubt as to whether the ancient medical writers knew anything regarding the disease called scarlatina. For many years, it is certain that the disease was supposed to be but a species of measles. It is claimed by many modern authors that Ingrassias was the first physician who noticed that measles and scarlatina were two different and separate affections. Ingrassias called the disease *Rossaniam*, and all medical historical writers quote the well-known passage, "*Nonnulli morbillos et rossaniam eundem esse morbum existimarunt: nos ipse nostrismet oculis diversos eorum affectus esse videmus; morbilli enim racematim venire solent.*" (*De tumoribus præter. natur.*, cap. 1, p. 194, 1556.)†

The oldest medical monograph on the subject of scarlatina dates from 1578, and was written by a French physician named Jean Coyttar. Yet again, some medical writers claim that Sennert made the first *clear mention* of the disease, during an epidemic he observed at Wittenburg in the year 1619. Quotations are used from Sennert's work to prove the point. (Sennert, *Opera Medica*, t. vi.,

* *Physique Sociale*, Ad Quetelet, St. Petersburg, 1869.

† *Dictionnaire de Médecine ou Répertoire Général des Sciences Médicales*, Vol. XXVIII., p. 152, Paris, 1844.

lib. iv., cap. 12, p. 483, seq.)* Gregory states that, "In the year 1610, an epidemic angina, with scarlet eruption, raged in Spain, from which country it passed over, in 1618, to Naples, then governed by a Spanish viceroy. We naturally look, therefore, to Spanish and Italian authors for the first description of the anginose or malignant scarlet fever. The early Spanish writers are Ludovicus Mercatus (1612) and Michel Heredia (1626). The latter is particularly full and clear in his descriptions. The Italian authors are Sgambatus, "*de pestilente faucium affectu Neapoli saviente*" (1620)† Also, Oetius Clerus, "*de morbo strangulatoris*" (1636). Prior to 1800, at least forty different monographs were written on scarlatina. The various complications of the disease were noted and accurately described. It was also noticed that the type of the disease varied during different epidemics. Thus, according to French writers (refer to Dictionnaire de Medecine, p. 167), some epidemics were noted for their mildness; for instance, "those of London, observed by Sydenham, from 1661 to 1675; that of Yorkshire, cited by Ozanam, during which only seven deaths occurred out of one hundred and sixty-one cases; that of Copenhagen (Meza, 1787), in which the exanthemata was the most often without prodroma, and without tonsillitis." Some particular symptoms were noticed in various epidemics; thus, in that of Essex there was "severe pain in the occiput (Bruning, 1770;) that of Entrecastreaux, in the department of Var, by attacks of remittent fever (Fauchier, 1809;) that of Upsal and Stockholm (1741-42, Rosen), by hiccough; that of Nantes (1817, Olivier Mairy), by colics and tenesmus; that of the Isle of Cephalonia (1763, Angelo Zulatto), by a complicating affection of worms; that of Dresden (Ammon), by strangury at the commencement, among young patients. Finally, several epidemics were remarkable for the frequency of anasarca (1787, Christ. Gottlin, Hoffman; 1809, Torrence, in England); others by the presence of mumps and buboes (1672-1689, Morton, of London); by swelling of the neck (1840, Vose, at Liverpool); by ulceration of the genitals (1748-49, La Hagne); by gangrene of the throat and surface of the body (Cullen); by gangrene of blistered surfaces and leech bites (in Virginia); by the extreme gravity of the disease among women confined (1801, Joseph Frank, at the General Hospital of

* *Traite de Géographie et des Statistique Médeciales.* Par J. Ch. M. Boudin. Tome 11, p. 685.

† *Lectures on Eruptive Fevers.* George Gregory, New York, 1851, p. 147.

Vienna) ; by the rapidity of death (1775, Eischel at Copenhagen).” The reader, inclined still further to pursue the historical part of the subject, is referred to the bibliographical references before given. We shall now turn to the consideration of the medical geography of the disease.

GEOGRAPHICAL DISTRIBUTION OF SCARLATINA.—In the absence of any special work of reference regarding this subject, I am constrained to present such material as I have been able to glean from a careful perusal of various medical geographies. The notices of scarlatina are but few and far between in these works; and the indulgence of the reader is requested for the seemingly incomplete manner in which the material is arranged. I have used, as far as possible, quotations from the various authors, and have also given, in addition, the reference after each quotation. I am certain, however, that no fuller note is extant regarding the geographical distribution of the disease, than this one, now for the first time offered to the reader. It will be observed that we have chosen for a starting point the West Indies.

SCARLATINA AT THE ANTILLES.—In Cuba, St. Domingo, Jamaica, Martinique, and Guadalupe, and the numerous small islands that go to make up the Antilles, scarlatina is sometimes observed in a mild form. An epidemic occurred at Kingston, Jamaica, in 1842.* Rey remarks that at the Antilles, “Epidemics of scarlatina do not present the seasonary periodicity that we observe in the villages of Europe, and do not attain the same intensity.” (Rey, p. 103.)† Armand states that at Guadalupe it is seldom or never seen. (Armand.)‡ At the village of St. Pierre, in Martinique, there was an epidemic of scarlatina in 1836. Up to 1856 it had not re-occurred.

MEXICO.—In Mexico, in May, a month always remarkable for its dryness and high temperature, scarlatina is frequent. (Rey, *Ib.* p. 87.)

CENTRAL AMERICA.—In the absence of reliable statistics, we are led to think that scarlatina seldom or never occurs in Central America. No authorities consulted even mention the disease.

SOUTH AMERICA.—The disease is wide spread in this part of the globe. Rochard§ states that the nomad tribes of Indians who in-

* American Journal Medical Sciences, 1842, p. 256.

† *Geographie Medicale-Nouveau Dictionnaire*, Paris, 1872.

‡ *Traite de Climatologie Generale du Globe*, Paris, 1873.

§ *Climat. Dictionnaire de Medecine*, Paris, 1868.

habit the plains of Guiana suffer from scarlatina. In Chili, "Scarlatina often prevails in an epidemic form; it showed itself for the first time in this form at Valparaiso in 1827, when it made great ravages" (Rey). At Santiago, it is prevalent (Lagorde). "Epidemics of scarlatina prevail as often at Valparaiso as in Chili" (Armand). In Pern, "measles and scarlatina prevail ordinarily at the same time as small-pox" (Rey, p. 232). "In Peru, measles and scarlatina are the satellites of variola" (Armand, p. 758). In the valley of the Plata, occupied by the Argentine Confederation, Uruguay, and Paraguay, epidemics of scarlatina are of yearly occurrence. "Scarlatina is frequent and more insidious than variola" (Rochard, p. 202). Says Rey, speaking of the diseases of La Plata: "Scarlatina and measles are the principal febrile diseases in eruptive form; they are more pernicious than in Europe, and prevail almost always in an epidemic state" (Rey, p. 241.) At Montevideo there were three epidemics of scarlatina from 1840 to 1850 (Saurel). In Brazil, scarlatina prevails at times (Rey, p. 238). Rochard also mentions the same fact. Says Thomas,* "According to D'Alves, scarlatina first appeared among the Brazilian Indians in 1828, and then occurred sporadically, but in the year 1833, and afterward, it raged with fearful intensity."

AFRICA.—At the Canary Isles, off the northwest coast of Africa, the principal one of which is Teneriffe, scarlatina is rarely ever seen; the same may be said regarding the island St. Helena (Armand). At Sierra Leone, on the western coast, "measles and scarlatina are unknown" (Rey, p. 118). At the Cape of Good Hope, "scarlatina unknown" (Rey, p. 247). At the Isle of Reunion, in the Mascarenha group, scarlatina occurs among Europeans, and is most often brought in ships (Rey). At Mauritius, scarlatina is endemic in the colony, and it becomes epidemic now and then (Rey). "Measles and scarlatina are very rare in Egypt" (Rochard, p. 137). At Mozambique, on the oriental side of Africa, there seems to be no scarlatina. At Madagascar rarely, if ever, any. In Senegal, Armand states that it is difficult to diagnose between measles and scarlatina at the commencement of the attack. In the meantime, it does not seem to have appeared epidemically among the blacks. In the dengue, that so frequently prevails in tropical countries, the appearance of an eruption closely resem-

*Ziemssens, *Cyclopedia of the Practice of Medicine*, article Scarlatina. Vol. 11. New York, 1875.

bling scarlatina is one of the prominent symptoms. This disease goes by the name of the red exotic fever (*fievre rouge exotique* at Senegal); Chinese fever; and in Brazil, South America, the *fievre polka*; at Reunion, the red fever. The eruption ends on the Fifth day by desquamation, which may be "morbilliform or scarlatinous" (Armand). In the Southern States of this country, epidemics of dengue or break-bone fever have not been uncommon, and the new name of *tropical scarlatina* would not be inappropriate for it, as there seems to be an intimate connection between the two diseases. In Egypt, according to Armand, scarlatina is seldom seen, if we except the scarlatinous eruption appearing in dengue, which disease often occurs at Port Said. It is known there as the "date fever," as it occurs at the date harvest in the autumn. The dengue is always accompanied by a scarlatinous eruption.

ASIA.—In Arabia, Palgrave observed scarlatina at Nedjd (Armand, p. 150). In Syria and Mesopotamia, scarlatina is met with (Rey). In Turkey, scarlatina and measles are met with, but the first of these affections is much more rare than the second (Rochard, p. 188). Epidemics of scarlatina in Turkey occur in summer, the hot season at Constantinople (Rey). In Constantinople, it is often prevalent in July and August. In 1867, there was an epidemic of scarlatina in that city (Armand). Scarlatina is seen in Smyrna at times (Thomas). In Persia, "scarlatina shows itself, as in Europe," in its epidemic form (Tholozan, quoted by Rey). Epidemics of scarlatina appear frequently in Persia (Rochard, p. 151). In India, "The existence of scarlatina has not been demonstrated. There prevails, however, from time to time, a remittent fever accompanied by an eruption, but authors who have described it do not regard it as identical with the scarlatina of our climate" (Rochard, p. 92). A contrary view seems to be held by Thomas, who, quoting Marnsall and Cunningham, says, "Scarlatina attacked India, which had enjoyed immunity a long time." The writer has been unable to find any proof to substantiate this latter assertion, and if there have been any epidemics among the natives of India, I have not yet found such records. That European colonies sometimes suffer from the disease may be granted, but that scarlatina has become acclimatized there, is a matter to be doubted.

In Ceylon, "Scarlatina has never been seen. If we are to believe the researches made by English physicians, this disease has never been manifest in India" (Rey, p. 157). In Burmah, Java, and Sumatra, it is seldom or never seen (Armand).

CHINA.—Little or no scarlatina in Canton (Armand, p. 525). At Macao, "scarlatina and measles prevail as epidemics in February, March, and April" (Armand). No mention of scarlatina is made in speaking of Chusan, Ung Po, Fou Chow, Amoy, Shanghai, or Tehe Fou. Among the French troops at the garrison of Tien-Sin in 1861, there were two deaths from the disease.

Scarlatina prevails as an epidemic at Pekin (Armand). "Eruptive fevers (scarlatina) are common in Pekin" (Rey, p. 337). At Macao, scarlatina frequently prevails in the winter season (Rey).

JAPAN.—At the island of Jesso, scarlatina is rarely seen. At the island of Kiou-Sion, according to Gaigneron, scarlatina is a very common disease (Armand, p. 791).

OCEANICA.—Scarlatina has been prevalent "since 1849 in Australia" (Thomas). At the Marquesas (Society Isles), "scarlatina and measles show themselves from time to time" (Rochard). At Tahiti, "scarlatina is sometimes severe" (Armand). In New Caledonia and Van Dieman's Land, it seems to be rare. "Scarlatina has never made a distinction between the several races and the natives of New Zealand" (Murchison, quoted by Thomas).

EUROPE.—From the time the disease was first noticed at Wittenberg, in 1619, up to the present day, scarlatina has been one of the plagues of Europe. There is not a country or province where the disease has not appeared. The medical literature regarding the subject is voluminous, and the notes and histories of epidemics are so numerous that the writer will only give in passing a few references. The disease may almost be said to be endemic in that quarter of the globe. Boudin speaks of epidemics occurring in Varsovia and Breslau, in 1627, described by Doering, and also the following notable epidemics, with the names of the physicians who have described them subjoined:

"Silesia, 1642 (Winsler); Saxony, 1652 (Fehr); Poland, 1664 (Schultz); Edinburgh, 1680 (Sibbald); London, 1661, 1689 (Sydenham and Morton); Dresden, Wurtemberg, and Ulm, 1690, 1696; Berlin, 1716, 1720 (Gohl); Eisenach, 1717, 1741 (Stoerck); London, 1747 (Fothergill); Hague, 1748; France and Spain, 1751 (Navier); Plymouth, 1751, 1753 (Huxam); Vienna, 1757, 1759; Switzerland, 1761 (Tissot); Ionian Isles, 1763 (Zulatti); Stockholm, 1763; Vienna, 1770 (De Haen); Montpellier, 1765 (Sauvages); Rotterdam, 1777 (Biekes); Copenhagen, 1777 (De Meza); Genoa, 1784 (Corecelli); Magdeburg, 1795 (Sachte); Langres, 1820 (Robert); Wittenberg, 1801 (Kreysig); Aschaffenburg, 1812 (Reuss);

Prague, 1812 (Böhme); Marseilles, 1822 (Robert)." (See Bondin, Tome II., p. 686.) The same writer refers to scarlatina at Edinburgh, Leith, Glasgow, Dundee, Paisley, Greenwich, Aberdeen, and Perth, in Scotland. Thomas gives many notes of German epidemics, among which a few may be mentioned, occurring at the following points: Stuttgart, in 1846, 1853, 1856, 1862, 1867, 1868; in the Tyrol, 1847-48; Wurzburg, Bavaria, 1867; Dresden, Saxony, 1862; Königsberg, 1860, 1867; Berlin, Prussia, 1852, 1854, 1856 (Thomas). In Iceland, from 1827 to 1837, the absolute number of deaths from scarlatina was 119, or 0.8 out of every 100 deaths (Boudin). At Copenhagen, the disease is common (Ad Hannover); there was an epidemic in this town in 1864 (Thomas). "At Guernsey, scarlatina and measles are generally benign" (Rey, p. 266). At Brussels, in Belgium, according to Bertillon and Jansses (quoted by Rey), from 1862 to 1866, for one thousand general deaths, 13.4 were from scarlatina. The disease prevails as an epidemic every four or five years, at Bruges, in Flanders. In France, "We can not say that the disease is very frequent; during the year 1867 this disease showed itself in an epidemic state only in the departments of the Basse Alps, Calvados, Indre and Loire, Lot et Saronne, Moselle, and Seine et Oise" (Rey). In 1868, it prevailed as an epidemic in some departments. According to a table of Elys, from 1865 to 1869 the mean annual of deaths from scarlatina in Paris was 142. At Lyons, according to Merny and Quesnoy, during the years 1861-2-3, 47 persons died from scarlatina (Rey). At Paris, during the five years, 1865-69, "scarlatina had a mean average of 142 deaths per annum; that is to say, 0.78 per 1,000 inhabitants, and 3 for 1,000 deaths. There was quite an epidemic in 1868, and especially in 1869; we had 6 for 1,000 deaths, and 1.47 for 10,000 inhabitants. The season of July, August, and September gave the greatest mortality. Throughout France, epidemics occasionally occur" (Armand). In Russia, the Danubian province of Roumania suffers at times from scarlatina (Rey). In Italy, "Every year we see scarlatina prevailing in the form of slight epidemics in some communes of the province of Brescia. It shows itself, and more seriously, in the Neapolitan country. It is a mistake, nevertheless, that this eruptive fever presents itself in the south of Europe with the frequency and gravity that it acquires in England" (Rey, p. 301). In Switzerland, according to Marc D'Espine, from 1838 to 1855, the absolute number of deaths from scarlatina was 83, or 4.9 to every 1,000 deaths. At the Faroe Isles,

"scarlatina is unknown" (Rey, p. 372). At Malta, "measles and scarlatina are rare" (C. Ely, quoted by Rey).

GREAT BRITAIN.—English medical literature is replete with interesting statistics regarding the subject. It is not, however, our intention to give anything more than a few brief notes concerning the disease as it prevails in "our mother country." From a late number of the Practitioner,* we select the following extract: "The present prevalence of scarlet fever suggests the consideration of the status of this disease in the kingdom. It appears to be becoming, if it have not already become, supereminently the 'English plague.' During the twenty-one years, 1851-71, it killed, on an average, 18,400 persons yearly, and its annual mortality ranged from 9,000 to 32,500. Within this period there were five epidemics of the disease. The two earliest of these epidemics each lasted a year; the two next lasted each two years; the last epidemic extended over not less than four years. The first epidemic occurred in 1852, and killed 18,887 persons; the second in 1854, and killed 18,928; the third in 1858-59, and killed 43,021; the fourth in 1863-64, and killed 60,175; the fifth in 1868-71, and killed 100,663. The following are the figures of the mortality of the disease year by year:

YEAR.	DEATHS.	YEAR.	DEATHS.	YEAR.	DEATHS.
1851.....	13,634	1858.....	23,711	1865.....	17,700
1852.....	18,887	1859.....	19,310	1866.....	11,685
1853.....	15,699	1860.....	9,305	1867.....	12,300
1854.....	18,928	1861.....	9,077	1868.....	21,912
1855.....	16,229	1862.....	14,834	1869.....	27,641
1856.....	13,557	1863.....	30,475	1870.....	32,543
1857.....	12,646	1864.....	29,200	1871.....	18,567

Total..... 388,340

The remarkable development which the disease has undergone in the latter part of the period under consideration, as compared with the former part, will at once arrest attention." (Practitioner, *loc cit.*) In Ireland, "I have been able to have twelve distinctly recorded scarlatina years—1763, 1800, 1819, 1843, 1845, and 1866" were the principal ones. So says Grimshaw of Dublin, who is quoted by Kennedy.†

* The Practitioner, No. 78. London, 1874, p. 452, et seq.

† Hospitalism and Zymotic Diseases. Evory Kennedy. London, 1869, p. 126.

Returning to nearer our own country again, we find that "scarlatina first appeared in Iceland in 1827; in Greenland in 1847-48" (Thomas). In British America, the disease is not uncommon, as, for instance, in Canada, Nova Scotia, and New Brunswick; while, according to Rey, it is rarely ever seen in Newfoundland. We shall now turn to the disease as it prevails in the United States.

UNITED STATES.—Scarlatina first appeared in North America, according to Thomas, in 1735. Boudin mentions epidemics in 1760-1770. It is more than likely that the disease occasionally showed itself during colonial times in the settlements of New England. It is only after the Revolution of 1776 that American medical literature seems to treat of the subject. In 1795 and 1796, an epidemic of scarlatina occurred at Leominster, Mass. Dr. Israel Allen seems to have been the author of the first American monograph on the subject, for he described the Leominster epidemic in a book entitled "A Treatise on the Scarlatina Anginosa, by Israel Allen, M.D., Leominster, Mass., 1796." It is possible there may have been earlier writers. I have only been able to find the annexed references from the work of Dr. Joseph M. Toner, who names the following early epidemics of scarlatina occurring in America:

"*Scarlatina*.—Connecticut, 1751, 1793, 1794; Vermont, 1787, 1793, 1796, 1797; Windsor, Bethel, Stockbridge, Barnard, Royalton, Woodstock, Randolph, 1795; Philadelphia, 1746, 1764, 1783, 1789, 1793, 1794; Kingston, Mass., 1735; Boston, 1702, 1735, 1795; Ulster, 1785; New England, 1787; New Haven, 1793, 1794; New York, 1792, 1793, 1794; Salem, Mass., 1783; Charlestown, 1784; North Fairfield, 1793; Massachusetts, 1793, 1796; Hartford, 1794; New Hampshire, Me., 1796; Bethlehem, Conn., 1792, 1793, 1794; Litchfield, 1793; New Jersey, Red Brook, 1789."*

Epidemics of scarlatina have occurred in every State and Territory in the Union. It is more than probable that the epidemics of 1790 became pandemic, for we see that within the succeeding five years it was noticed not only in New England, but in the Mississippi Valley—the latter, a fact recorded by Drake,* who noticed it

* Contributions to the Annals of Medical Progress and Medical Education in the United States. Washington, 1874, p. 94.

*The Principal Disease of the Interior Valley of North America. By Daniel Drake, of Cincinnati. Philadelphia, 1854, p. 595.

at Washington, Ky. I am also satisfied, from a careful investigation of the numerous histories of what were considered to be local epidemics, that the disease again became pandemic in or about 1830, and prevailed at numerous points until 1840. Again, there seems to have been another epidemic tendency prevailing through the different States from 1850 to 1854. The chain of evidence on which these conclusions are based will be furnished when I give the histories of scarlatina epidemics in the different States. In the meantime, as Drake noticed twenty years ago, the local epidemics of scarlatina occur almost wholly in those States "north of the 33d degree of latitude,"—a fact which will be again conclusively demonstrated, if reference is made to the census statistics of 1860 and 1870, as will be shown ere the close of this article. Since 1870, scarlatina has again assumed an epidemic form in the United States.

If the reader will carefully follow the references made to various portions of the globe, several points will be noticed :

1. The zone of comparative immunity in the eastern hemisphere extends from 10° south latitude to 20° north latitude.

2. A zone of comparative immunity in the western hemisphere extends from the equator to 10° north latitude.

3. Another zone of comparative immunity in the western hemisphere extends from 30° to 35° north latitude.

4. In times of pandemics, occasional epidemics occur at points within the zones of comparative immunity.

5. When scarlatina epidemics occur within the zones of comparative immunity, the disease attacks by preference the Caucasian race.

6. The outbreak of such epidemics in the zones marked first and second can always be accounted for by the arrival of ships having the disease aboard. Scarlatina can then be said to be imported within these zones, and having exhausted itself on the European settlers, the disease fails to become acclimatized, and dies out completely for long intervals of time.

7. In the zone marked third, the disease almost always exists in a sporadic form ; it only becomes epidemic when it is pandemic in the higher latitudes.

We find the following countries are within these zones :

1st Zone : Sumatra, Borneo, India, and most of Africa.

2d Zone : Venezuela, and States of Colombo.

3d Zone : South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Texas, with Northern Florida, in United States.

Scarlatina may then be said to be a *not uncommon disease* in Great Britain, Norway, Sweden, Denmark, France, Prussia, Austria, Russia, Italy, and Spain; in Turkey, Northern Arabia, Persia, China, Japan, Australia, and New Zealand; in Peru, Bolivia, Chili, Argentine Confederation, Uruguay, Paraguay, and Brazil; in Canada, the Eastern, Middle, and Western States of America, and in Mexico.

The character of the climate in the zones of comparative immunity may be thus briefly stated : Lying for the most part in the tropics and near the equator, exposed to the direct rays of the sun, a *high mean annual temperature* is of course noticeable.

Again, the zones of comparative immunity from scarlatina are the points where the lowest forms of *malarial fevers* are common. Yet, again, these zones being near the equator, are subject to the *heavy periodical rain-falls* of the tropics, and have at times an atmosphere fairly *saturated with humidity*.

We are led to conclude for these reasons, that *a very high temperature, combined with a periodically humid atmosphere, is unfavorable to the development of any scarlatinous tendency.*

Leaving this subject for the present, I shall now turn to the consideration of the disease as it has prevailed in the United States. Through correspondence with a number of health offices, scattered over various sections of the country, I have been enabled to collate a mass of new statistics. These mortality statistics will be carefully studied as we proceed, taking up the States one by one, and analyzing the records furnished by the ninth census. In addition, numerous notices of American epidemics of scarlatina, with the bibliographical references thereto, will be given.

The number of decedents from scarlatina and their respective ages, together with the seasons and months in which such deaths have occurred, are all matters especially noticed, and, besides, the seeming effects of altitude and temperature on the disease. The mortality from scarlatina in the principal cities of the United States has also been studied, and as far as possible I shall give general conclusions, deduced from a minute analysis of the entire subject viewed in all the various aspects I have heretofore enumerated. Commencing, then, with the New England section, we shall first study Maine.

SCARLATINA IN MAINE.—422 deaths occurred from scarlatina in Maine during the census year of 1870; 222 males, 200 females. 403 of the decedents were children—244 being under five years of age. Season of greatest mortality, spring. Month of greatest mortality, March. Maximum and minimum temperature of the State at month of greatest mortality, 23° to 32° Fahr. Average altitude of State above the sea level, 375 feet.

Reflections.—Population in 1870 was 626,915; 67,707 of this population were children under five years of age. Out of every 278 children under five years of age, then, one died of scarlatina. Cold weather during month of greatest mortality. With one exception, the decedents were whites. Epidemics of scarlatina occur in the State from time to time. Dr. A. P. Fuller, of Fayette, Kennebec county, says: "The disease first made its appearance in Fayette, April, 1832."* Dr. Page, of Hallowell, says:† "Scarlatina commenced its attacks at Hallowell in the month of March last, and continued with unusual severity until the expiration of the year 1832."

NEW HAMPSHIRE.—Total deaths from scarlatina, 96; males 36, females 60. Fifty of the decedents were children under five years of age. Season of greatest mortality, spring. Month of greatest mortality, April. Maximum and minimum temperature, 42° and 37° Fahr. Average altitude of State above the sea level, 625 feet.

Reflections.—Population in 1870 was 318,300; 29,665 of the population were under five years of age. Out of every 593 children under five years of age, one died of scarlatina. Cool weather, month of greatest mortality. All the decedents were white. Epidemics of scarlatina occur in the State from time to time. Dr. Samuel Webber, of Charlestown, says: "From October, 1837, to July, 1838, scarlatina prevailed in this place."‡

VERMONT.—Total deaths from scarlatina, 54; males 32, females 22. Thirty-two of the decedents were under five years of age. Season of greatest mortality, spring. Month of greatest mortality, February. Maximum and minimum temperature, 20° to 15° Fahr. Average altitude of State above the sea level, 600 feet.

Reflections.—Population in 1870, 330,551; 37,363 of the popu-

* Boston Medical Journal, Vol. IX. (1833), p. 303.

† Boston Medical Journal, Vol. VII., p. 10.

‡ American Journal Medical Sciences, Vol. XXIII., p. 363.

lation were under five years of age. Out of every 1,168 children under five years of age, one died of scarlatina. Cold weather, month of greatest mortality. Decedents all whites. Epidemics of scarlatina occasionally occur. Dr. David Gilbert, of Brattleboro, writing in 1842, remarks: "Scarlet fever has been at times, for the last twelve years, very prevalent in the region where I have resided."*

RHODE ISLAND.—Deaths from scarlatina, 186; males 101, females 85. 118 of the decedents were under five years of age. Autumn and winter were the seasons of greatest mortality. Month of greatest mortality was December. Maximum and minimum temperature, 34° to 29° Fahr. Average altitude of State above the level of the sea, 125 feet.

Reflections.—Population in 1870, 213,253; 23,288 of this population were children under five years of age. Out of every 198 children under five years of age, one died of scarlatina. Cold weather during month of greatest mortality. With four exceptions the decedents were whites. Epidemics of scarlatina frequently occur in Rhode Island. Dr. S. O. Griffins of Burrissville,† gives the history of an epidemic observed in that town in 1856. Dr. Charles Parsons, of Providence,‡ says of the mortality of the State from scarlatina: "The table shows that more deaths have been ascribed to scarlatina than to any other of this class of diseases. In the whole series of reports for ten years and seven months, there has been 1,088 deaths by scarlatina, or a little more than one in twenty of those from given causes."

Dr. Edwin M. Snow, of Providence,§ states: "With the exception of the three years—1856, 1864, and 1869—there were never more deaths from scarlatina, in any year in Providence, than in 1873. The disease prevailed with severity throughout the year, visiting one part of the city after another, and causing an unusual number of deaths in the summer season. The number of deaths in each month was as follows: In January, 8; February, 5; April, 6; May, 10; June, 11; July, 10; August, 12; September, 17; October, 9; November, 15; December, 23. Total, 132."

* Boston Medical and Surgical Journal, Vol. XXVI., p. 325.

† Transactions American Medical Association, Vol. XV.

‡ *Ib.*, 1864, p. 218.

§ Ninetenth Annual Report upon the Births, Marriages, and Deaths in the City of Providence, 1874, p. 61, et seq.

It will thus be seen that there were nineteen in the first quarter; twenty-seven in the second; thirty-nine in the third, and forty-seven in the last. Sixty-two of the decedents were males and seventy were females; fifty-eight of American and seventy-four of foreign parentage. Four of them were adults. The general statistics of scarlatina for eighteen years are as follows:

Deaths in Providence from Scarlatina.

YEARS.	SEX.		PARENTAGE.		WHOLE NUMBER.
	Male.	Female.	American.	Foreign.	
1856.....	75	69	74	70	144
1857.....	13	19	18	14	32
1858.....	34	38	38	34	72
1859.....	24	21	31	14	45
1860.....	7	10	11	6	17
1861.....	12	16	14	14	28
1862.....	6	8	3	11	14
1863.....	13	20	16	17	33
1864.....	68	73	50	91	141
1865.....	55	53	49	59	108
1866.....	1	2	2	1	3
1867.....	3	7	7	3	10
1868.....	26	24	16	34	50
1869.....	61	77	52	86	138
1870.....	15	20	13	22	35
1871.....	13	8	9	12	21
1872.....	8	11	8	11	19
1873.....	62	70	58	74	132
Total.....	496	546	469	573	1,042

CONNECTICUT.—Deaths from scarlatina, 286; males 152, females 136. 188 of the decedents were children under five years of age. Season of greatest mortality, spring. Month of greatest mortality, April. Temperature, 46° Fahr. Average altitude of State above the sea level, 300 feet.

Reflections.—Population in 1870 was 537,454. 58,635 of this population were children under five years of age. Out of every 312 children under five years of age, one died of scarlatina. Cool weather during month of greatest mortality. With three exceptions all the decedents were white. Epidemics of scarlatina occur in the State from time to time. Dr. Daniel Holt, of Glastenburg, describes an epidemic occurring in 1840.*

MASSACHUSETTS.—Total deaths from scarlatina, 911; males 459, females 452. 607 of the decedents were under five years of age. Season of greatest mortality, summer. Month of greatest mor-

* Boston Medical Journal, Vol. XXIV., 1841, p. 133.

tality, June. Maximum and minimum temperature, 68° and 62° Fahr. Average altitude of State above the sea level, 400 feet.

Reflections.—Population in 1870 was 1,457,351. Of this population, 156,889 were children under five years of age. Out of every 259 children under five years of age, one died of scarlatina. Warm weather month of greatest mortality. Only two of the decedents were blacks. Epidemics of scarlatina frequently occur—one of the earliest mentioned epidemics, before spoken of, occurring in 1795. “In 1849, the deaths by this disease formed very nearly six per cent. of all the deaths in the State, and in 1852 nearly five per cent.”*

Dr. Enoch Hale speaks of an epidemic occurring in 1844.†

Dr. Edward Warren, of Newton, has given an account of another epidemic.‡

Indeed, the disease is quite common in Massachusetts. The reader in search of more voluminous information regarding this point, is referred to the elaborate compilation of statistics to be found in the registration reports of the State.||

EX RESUME.—The total number of deaths in New England from scarlatina, during the census year 1870, was 1,955. These deaths were distributed through the different months as follows :

March.....	225	October.....	88
April.....	176	November.....	119
May.....	173	December.....	167
June.....	199	January.....	193
July.....	173	February.....	191
August.....	138		
September.....	113	Total.....	1,955

As regards season of the year, the most deaths occurred in winter and spring—the colder seasons. Spring, 574; summer, 510; autumn, 320; winter, 551. Of the decedents, 1,002 were males and 953 were females. As the female portion of the population exceeds the male population by over 70,000 in New England, it will at once be seen that the mortality from scarlatina was greatest among the male sex. The seeming influence of altitude on the disease may be seen in the following table :

* Boston Medical and Surgical Journal, 1854, p. 86.*

† New England Quarterly Journal, Vol. I., p. 19.

‡ Boston Medical Journal, Vol. XXIV., 1846, p. 89.

|| Registration Reports of Massachusetts, 1859–72.

STATE.	AVERAGE ALTITUDE. FEET.	DEATHS FROM SCAR- LATINA TO AGGRE- GATE POPULATION.	DEATHS IN POPULA- TION UNDER FIVE YEARS OF AGE.
Maine.....	375	1 in every 1,486	1 in every 278
New Hampshire..	625	1 " 3,316	1 " 593
Vermont.....	600	1 " 6,122	1 " 1,168
Rhode Island.....	125	1 " 1,169	1 " 198
Connecticut.....	300	1 " 1,880	1 " 312
Massachusetts,...	400	1 " 1,600	1 " 259

In Maine, Rhode Island, Massachusetts, and Connecticut—States having an average altitude of 400 feet and under—the total deaths from scarlatina were 1,805, to a population numbering 2,839,073, thus giving one death from the disease to every 1,568 of aggregate population. In New Hampshire and Vermont—States having an altitude of 600 feet and upward, and a population numbering 648,857—there were 240 deaths from scarlatina, or one death to every 2,704 of aggregate population. From this statement it is easily seen that the following proposition can be safely made:

Altitude in the New England States seems to diminish the tendency to scarlatina.

This proposition is the stronger for the reason that the death-rate to aggregate population, and the death-rate to the population under five years of age, seem to coincide, when looked at and studied in their seeming relations to altitude. The dense population to the square mile in Rhode Island and in Massachusetts must be considered as an important point. These States are the two most densely populated in the United States, and as overcrowded localities are the harvest-fields of contagious diseases of all kinds, this fact must be taken into consideration in judging of the seeming effects of altitude on the disease. We now turn to the study of the disease as it prevails in the *Middle States*.

NEW YORK.—Total deaths from scarlatina, 3,403; males 1,745, females 1,658. Of the decedents, 2,295 were under five years of age. Spring was the season of greatest mortality. The month of greatest mortality was January. The maximum and minimum temperature was 31° and 18° Fahr. Average altitude of the State above the level of the sea, 800 feet.

Reflections.—Total population, 4,382,759. Of this population, 520,528 were under five years of age; so that to every 227 of population under five years of age, one died of scarlatina. The weather was cold at the period of greatest mortality. Only 25 of the decedents were colored. Epidemics of scarlatina frequently occur in

the State. Says Dr. Levi Wheaton :* " On the borders of the Hudson, where bilious fevers prevailed in 1794-95, I had abundant opportunities to treat scarlet fever, which was epidemic."

Dr. D. H. Squier,† of Elmira, states that epidemic scarlatina sometimes shows itself at that point. The disease has prevailed as an epidemic, at Troy, on several occasions, according to Dr. Thomas C. Brinsmade.‡ At Buffalo, Dr. Langworthy§ states: " The number of deaths is unprecedented in this city for any one year." The mortality, during this epidemic of 1862, in Buffalo, was 205.

In the city of New York the disease appears as an epidemic every few years; indeed, it is almost endemic, and may be considered one of the most fatal of the intercurrent diseases of the metropolis. I have compiled the following table from a number of various sources. For the more early statistics of scarlatina, I am indebted to an article written by Dr. Joseph M. Smith;|| for more recent statistics, to Dr. Cyrus Ramsay.¶

YEAR.	DEATHS.	YEAR.	DEATHS.	YEAR.	DEATHS.
1804.....	14	1824.....	3	1844.....	225
1805.....	4	1825.....	10	1845.....	63
1806.....	4	1826.....	24	1846.....	114
1807.....	2	1827.....	4	1847.....	142
1808.....	4	1828.....	11	1848.....	93
1809.....	9	1829.....	188	1849.....	266
1810.....	1	1830.....	246	1850.....	311
1811.....	0	1831.....	258	1851.....	627
1812.....	0	1832.....	221	1852.....	613
1813.....	1	1833.....	179	1853.....	392
1814.....	1	1834.....	418	1854.....	517
1815.....	0	1835.....	174	1855.....	1052
1816.....	0	1836.....	202	1856.....	1283
1817.....	3	1837.....	579	1857.....	1325
1818.....	0	1838.....	257	1858.....	668
1819.....	5	1839.....	158	1859.....	840
1820.....	5	1840.....	191	1860.....	1927
1821.....	3	1841.....	366	1861.....	1278
1822.....	1	1842.....	416	1862.....	928
1823.....	2	1843.....	223	1863.....	903

Total..... 17,754

Dr. James G. Watt, health officer of Brooklyn, has kindly fur-

* Boston Medical Journal, Vol. XXXIX., 1849, p. 176.

† Transactions State Medical Society of New York, 1855, p. 134.

‡ Transactions State Society of New York, 1858, p. 279.

§ Transactions State Society of New York, 1863, p. 235.

|| Transactions Amer. Med. Association, Vol. XIII., 1860, p. 183.

¶ Transactions Amer. Med. Association, Vol. XV., p. 246.

nished me the following statement regarding scarlatina in that city:

YEAR.	DEATHS.
1870 (8 months).....	136
1871	528
1872	327
1873	314
1874	479

From these statements it will be seen that the larger cities of New York suffer severely at times from the disease.

NEW JERSEY.—Total deaths from scarlatina, 781; males 404, females 377. Of the decedents, 511 were under five years of age. Spring was the season of greatest mortality. May was the month of greatest mortality. The maximum and minimum temperature was 60° and 58° Fahr. Average altitude of the State above the level of the sea, 200 feet.

Reflections.—Population, 906,096. Of this population, 119,623 were under five years of age; so that out of every 235 of the population under five years of age, one died of scarlatina. The weather was warm during month of greatest mortality. All the decedents but 19 were whites.

PENNSYLVANIA.—Deaths from scarlatina in 1870, 5,645; males 2,833, females 2,812. Of these, 3,863 were under five years of age. Spring was the season of greatest mortality. March was the month of greatest mortality. The maximum and minimum temperature in that month was 45° to 38° Fahr. The average altitude of the State above the level of the sea is 750 feet.

Reflections.—Total population, 3,521,791. Of these, 492,341 were under five years of age; so that out of every 128 of the population under five years of age, one died of scarlatina. The weather was cool the month of greatest mortality. All the decedents except 36 were whites. Epidemics of scarlatina occur from time to time in this State. Dr. Felix Pacalis, in a communication dated Philadelphia, February 8, 1802, says: "We have been visited, during the last winter month, by the scarlatina anginosa or cynanchica (scarlet sore throat").*

Dr. Callaghan, of Pittsburg, says: "Scarlatina anginosa appeared in the city in the month of May, 1830, and continued to January, 1831."†

Dr. B. F. Schneck, of Lebanon, states, "During the past twelve

* Med. Repository, New York, 1803, p. 163.

† Boston Medical Journal, Vol. IV., 1831, p. 240.

or fourteen months, a severe epidemic of scarlatina has prevailed in my neighborhood."*

Dr. A. P. Dutcher speaks of an epidemic occurring at Enon Valley about the same time.†

At Pittsburg, in 1871, there were 90 deaths from scarlatina; in 1872, 61 deaths; in 1873, 122 deaths. Says Crosby Gray, the health officer: "Scarlet fever caused 122 deaths—58 males and 64 females. Eleven of these deaths occurred in the winter, 23 in the spring, 35 in the summer, and 53 in the autumnal quarter—a total of 122; being 3.46 per cent. of the total mortality, against 2.48 per cent. for the previous year."‡

In Philadelphia, from 1809 to 1868 inclusive, a period of sixty years, there were 13,016 deaths from scarlatina, according to the table of Meigs & Pepper.|| For the following four years the figures are taken from the reports of the board of health of that city:§

YEAR.	DEATHS.	YEAR.	DEATHS.	YEAR.	DEATHS.
1809.....	3	1831.....	200	1853.....	388
1810.....	2	1832.....	307	1854.....	162
1811.....	3	1833.....	61	1855.....	163
1812.....	1	1834.....	83	1856.....	992
1813.....	0	1835.....	305	1857.....	704
1814.....	0	1836.....	240	1858.....	241
1815.....	0	1837.....	205	1859.....	232
1816.....	0	1838.....	134	1860.....	591
1817.....	0	1839.....	225	1861.....	1,190
1818.....	1	1840.....	244	1862.....	461
1819.....	2	1841.....	83	1863.....	275
1820.....	31	1842.....	220	1864.....	349
1821.....	13	1843.....	395	1865.....	624
1822.....	9	1844.....	269	1866.....	491
1823.....	11	1845.....	199	1867.....	367
1824.....	9	1846.....	221	1868.....	224
1825.....	9	1847.....	344	1869.....	799
1826.....	4	1848.....	172	1870.....	956
1827.....	1	1849.....	242	1871.....	262
1828.....	0	1850.....	440	1872.....	174
1829.....	9	1851.....	391		
1830.....	40	1852.....	434	Total.....	15,207

From the Philadelphia Health Report of 1872, p. 43, et seq., we quote the following:

* American Journal Medical Sciences, 1857, p. 27.

† Cincinnati Lancet and Observer, 1858, p. 651.

‡ Reports Board of Health, City of Pittsburg, 1871-72, also 1873, p. 67. Crosby Gray, Health Officer.

|| Diseases of Children. Meigs & Pepper, Philadelphia, 1870, p. 665.

§ Report of Board of Health, City and Port of Philadelphia, 1873.

"*Scarlet Fever*.—This scourge of childhood has been less fatal than usual the present year. The number of deaths was less by eighty-eight than that reported for 1871. The following table shows the annual mortality from scarlet fever, and its percentages upon the whole number of deaths, from all causes (still-born excluded), from 1861 to 1872 inclusive :

" YEAR.	TOTAL MORTALITY.	DEATHS FROM SCARLET FEVER.	PER CENT. OF DEATHS TO TOTAL MORTALITY.
1861.....	13,838	1,190	8.59
1862.....	14,386	461	3.20
1863.....	15,045	275	1.82
1864.....	16,794	349	2.07
1865.....	16,453	624	3.79
1866.....	16,005	491	3.06
1867.....	13,153	367	2.78
1868.....	13,949	224	1.60
1869.....	13,997	799	5.70
1870.....	15,928	956	6.00
1871.....	16,118	262	1.62
1872.....	19,710	174	0.88
Totals.....	185,376	6,172	3.32 "

The above table shows that the deaths from scarlet fever and the percentage to the total mortality were less in 1872 than in any preceding years. The average percentage of deaths from this disease to the whole number of deaths, for the twelve years included in the foregoing table, was 3.32; for the eleven years preceding 1872, it was 3.62; for 1872, the ratio was but .88 of one per cent.

By examining the bills of mortality as far back as 1807, we find that during the twenty-four years, from 1807 to 1830 inclusive, only 162 deaths were recorded from scarlet fever. For the first six years of this period, namely, from 1807 to 1812, only thirteen deaths were placed upon the record; from the latter year to 1818, not a single death was registered. In 1831, as many as 200 deaths were charged to this disease. From this date up to the present time it has prevailed extensively, and, at periods, with terrible fatality. Whether, during the twenty-four years above alluded to, there was remarkable exemption from this disease, or the deaths from scarlet fever were reported under other terms, as Dr. Emerson suggests, is impossible to state with any degree of certainty. But, supposing the deaths from scarlet fever to have been returned under the title of sore throat, the number was not sufficiently great

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to unsettle the opinion of the limited prevalence of this disease during the years referred to.

The following table exhibits the deaths from scarlet fever, and the percentage of deaths to the total mortality, exclusive of still-born, for forty-two years, from 1831 to 1872 inclusive :

YEARS.	TOTAL MORTALITY.	DEATHS FROM SCARLET FEVER.	PER CENT. OF
			DEATHS TO TOTAL MORTALITY.
1831 to 1840.....	49,678	2,004	4.03
1841 to 1850.....	64,191	2,585	4.02
1851 to 1860.....	100,635	4,298	4.27
1861 to 1872.....	185,376	6,172	3.32
Total.....	399,880	15,059	3.76

It will be observed that in the three decennial periods the proportion of deaths to total mortality varied but a few hundredths of one per cent., but in the twelve years, 1861 to 1872, it diminished to a very considerable extent, being much less than the average of the preceding thirty years. Of 15,059 deaths from scarlet fever in the past forty-two years, 7,411, or 49.213 per cent., were males, and 7,648, or 50.787 per cent., were females—an excess of the latter of only 1.574 per cent. A very slight excess of mortality among females will be noted in each of the several periods into which the forty-two years have been divided.

There were 14,341 deaths, or 95.23 per cent., in the first ten years of life, of which 9,867, or 65.49 per cent., were in the four years from one to five. 233, or 1.54 per cent., occurred in ages over twenty years. It will be seen from these results that scarlet fever is pre-eminently a disease of infancy and childhood, and is particularly fatal between the first and fifth year of life.

We now turn to the consideration of Delaware.

DELAWARE.—Total deaths from scarlatina in 1870, 58; males 31, females 27. Of the decedents, 38 were under five years of age. The season of greatest mortality was spring. No month was especially marked as regards mortality. The maximum temperature, the season of greatest mortality, was about 53° Fahr. Average altitude of the State above the level of the sea, 100 feet.

Reflections—Population, 125,015. Of these, 16,713 were under five years of age; so that out of every 440 of the population under five years of age, one died of scarlatina. The greatest mortality occurred in warm weather. All the decedents except four, were white.

EN RESUME.—The total population of this Middle States section was 8,935,661. The total number of decedents from scarlatina was 9,887. Of these, 5,013 were males, and 4,874 were females. The distribution of deaths by months was as follows:

March.....	1,322	September.....	392
April.....	1,224	October.....	429
May.....	1,152	November.....	588
June.....	607	December.....	837
July.....	559	January.....	1,125
August.....	448	February.....	1,204
		Total.....	9,887

The deaths by seasons would then read as follows: Spring, 3,698; summer, 1,614; autumn, 1,409; winter, 3,166. From this statement it will be seen that more than two-thirds of the deaths occur in winter and in spring, and *in the coldest weather*. All the decedents, with the exception of 84, were whites. The following table will show the seeming effects of altitude on the disease:

STATE.	AVERAGE ALTITUDE.	DEATHS TO AGGREGATE POPULATION.	DEATHS IN POPULA- TION UNDER FIVE YEARS OF AGE.
New York.....	800	1 to 1,288	1 in 227
New Jersey.....	200	1 " 1 161	1 " 235
Pennsylvania.....	750	1 " 624	1 " 128
Delaware.....	100	1 " 2,156	1 " 440

In New Jersey and Delaware—States having an average altitude under 400 feet—one person to about every 1,229 of aggregate population died of scarlatina. In New York and Pennsylvania, having average altitudes above 400 feet, one person to about 874 of the aggregate population died of scarlatina. A study of these figures reveals the fact, that what was true of New England is reversed in the Middle States. The following proposition can then be made:

Altitude in the Middle States seems to increase the tendency to scarlatina.

In the meantime we might observe, *en passant*, that New Jersey is a densely populated State.

We shall now turn to the Southern States.

MARYLAND.—Total deaths from scarlatina in 1870, 331; males 163, females 168. Season of greatest mortality, winter. Of the decedents, 212 were under five years of age. Month of greatest mortality was March. Maximum and minimum temperature, 42°

and 39° Fahr. Average altitude of the State above the level of the sea, 375 feet.

Reflections.—Total population, 780,894. Of these, 108,467 were under five years of age, so that out of every 512 of the population under five years of age, one died of scarlatina. All the decedents were whites, except twenty-four. The weather was cool the month of greatest mortality. Epidemics of scarlatina occur from time to time in the State of Maryland.

Dr. Samuel Tyler describes an early epidemic of scarlatina occurring in Frederick City and Frederick county.* In 1857, there seems to have been an epidemic tendency in this State. Says Dr. A. M. White:† “Scarlet fever has prevailed to a considerable extent the last few years. It is generally first seen in the fall of the year, continuing during the winter and until late in the spring. Very hot weather in the region under consideration (Carroll, Harford, and Baltimore counties) checks its progress.”

Dr. Edmund G. Waters (Ib. p. 85), speaking of the epidemics of Baltimore, remarks: “The scarlet fever has paid us in the winter just past its annual visit.” The number of deaths from scarlatina in Baltimore for the year ending October 31, 1872, were 109; for the year ending October 31, 1873, 116 deaths; for the year ending October 31, 1874, 174 deaths.‡ From this it will be seen that for several years past Baltimore has had a decided scarlatinous tendency developing itself.

VIRGINIA.—Deaths from scarlatina, 43; males 21, females 22. Of the decedents, 28 were under five years of age. No particular season or month seems to present any great mortality. Average altitude of State above the level of the sea is 700 feet.

Reflections.—Population of State in 1870 was 1,225,163. Of this number, 183,469 were under five years of age; so that out of every 6,553 of the population under five years of age, one died of scarlatina. It is very evident that all these cases were sporadic. Of the decedents, 12 were colored. Epidemics of scarlatina have occurred in the State of Virginia at long intervals. Says Dr. H. D. Magill: “In the year 1832 the scarlet fever made its appearance in the northern counties of the valley of Virginia, and extended its ravages across the Blue Ridge Mountains into the contiguous counties

*American Journal Medical Sciences, 1846, p. 539.

†Transactions American Medical Association, Vol. X., 1857, p. 81.

‡Reports Board of Health of Baltimore, 1872-3-4. James A. Stewart, M.D., Health Officer.

of Loudon and Fauquier.”* Dr. Richard A. Sale, of Bedford county, gives an account of an epidemic observed there.† I am indebted to Dr. J. G. Cabell, health officer of Richmond, for the subjoined statement of mortality from scarlatina in that city from 1871 up to October 27, 1874, inclusive :

YEAR.	WHITES.	COLORED.	TOTAL DEATHS.
1871.....	1	0	1
1872.....	1	1	2
1873.....	3	1	4
1874	1	0	1
	<hr/> 6	<hr/> 2	<hr/> 8

Dr. C. states, in his report for 1873,‡ that “ the report of deaths is very favorable, there having been only four; in the year 1872, two deaths; in 1871, one death.”

NORTH CAROLINA.—Total deaths from scarlatina, 14; males 5, females 9. Of these, 8 were under five years of age. No particular season seems to present a marked mortality. In July, with an maximum and minimum temperature of 81° and 78° Fahr., there were five deaths. Average altitude of State above level of the sea, 550 feet.

Reflections.—Population in 1870 was 1,071,361. Of this population 163,271 were under five years of age; so that out of every 20,409 of the population under five years of age, one died of scarlatina. All the decedents were white except three.

Dr. James H. Dickson remarks :|| “ Scarlatina may be said to be one of our regular epidemics. Very few years pass without the occurrence of sporadic cases of this disease, and every three or four years we have it prevailing as an epidemic. No section of the State can now be said to enjoy an exemption from this terrible pestilence. At Wilmington, it first appeared in 1835.” Two other epidemics at Wilmington are mentioned by Dickson, one of which occurred in 1854, the other in 1858. Dr. McKee reports an epidemic of the disease occurring at Raleigh in the year 1855. Dr. Cox reports an epidemic occurring in Perquiman county in 1858. (Ib. p. 305.)

SOUTH CAROLINA.—Deaths from scarlatina, 18; males 11, fe-

*American Journal Medical Sciences, Vol. XXIV., p. 341.

†Medical Examiner, Vol. III., Philadelphia, 1840, p. 42.

‡Report Board of Health of Richmond, Virginia, 1873, p. 26.

||Transactions American Medical Associations, Vol. XIII., 1860.

males 7. Of these, 11 were under five years of age. Winter was the season of greatest mortality. No particular month was remarkable for its mortality. Average altitude of State above the level of the sea, 350 feet.

Reflections.—Population of State in 1870 was 705,606. Of these, 109,322 were under five years of age; so that out of every 9,939 of population under five years of age, one died of scarlatina. The season of greatest mortality was cool. Surprising to state, all the decedents except five, were blacks.

Scarlet fever rarely ever prevails as an epidemic in this State. In 1838 an epidemic of scarlatina broke out at the orphan-house in Charleston. This epidemic has been fully described by Dr. George Logan.*

GEORGIA.—Deaths from scarlatina in 1870, 12; males 4, females 8. Of these, four were under five years of age. Winter was the season of greatest mortality. Average altitude of State above the level of the sea, 575 feet.

Reflections.—Population in 1870 was 1,184,109. Of this number, 189,408 were under five years of age; so that out of every 47,351 of the population under five years of age, one died of scarlatina. All the decedents except five, were whites. The greatest mortality was in the cooler weather. Scarlet fever rarely ever prevails as an epidemic in Georgia.

Dr. F. M. Roberts states: "Scarlatina made its appearance in Augusta about the 20th of December, 1832, and has continued with more or less violence up to the present time (1833)."[†]

Dr. Briggs, of Troupville, Lowndes county, remarks: "Scarlatina prevailed co-extensive with the limits of the county during the years 1838 and 1839. It has appeared twice since, in 1844 and 1855; but could scarcely be considered an epidemic either of the last two times."[‡]

To the valuable statistical work of Dr. Duncan, of Savannah, I am indebted for the following figures, regarding scarlatina, in that city, for the period embraced between January 1, 1854, and December 31, 1869: ||

*American Journal Medical Sciences, Vol. XXIV., p. 71.

†American Journal Medical Sciences, Vol. XIII., p. 375.

‡Transactions of the American Medical Association, p. 139.

||Tabulated Mortuary Record of the City of Savannah, by W. Duncan, M.D., Savannah, 1870.

YEAR.	DEATHS.
1854.....	9
1855.....	13
1856.....	0
1857.....	1
1858.....	2
1859.....	11
1860.....	9
1861.....	17
1862.....	17
1863.....	9
1864.....	0
1865.....	0
1866.....	1
1867.....	0
1868.....	0
1869.....	0
Total.....	—89

The following additional table was kindly furnished me by Dr. Duncan, who states in a letter, that the disease has not prevailed to any great extent in Savannah since the war, which is due, he thinks, "to the climate and well-ventilated condition of residences:"

	DEATHS.
October 1, 1869, to September 30, 1870.....	1
“ 1, 1870, “ “ “ 1871.....	5
“ 1, 1871, “ “ “ 1872.....	0
Jan'y 1, 1872, to December 31, 1872.....	0
“ 1, 1873, “ “ “ 1873.....	5
“ 1, 1874, “ “ “ 1874.....	6
Total.....	—17

So that, in a period of twenty-two years, the deaths from scarlatina, in Savannah, have only been 106. The population of the city in 1850 was 15,312; in 1860, 22,292; in 1870, 28,234.

FLORIDA.—Deaths from scarlatina in 1870 were ten; males five, females five. Of these decedents, seven were under five years of age. The season of greatest mortality was winter. The month of greatest mortality was February. The maximum and minimum temperature during the month of greatest mortality was 70° and 56° Fahr. Average altitude of the State above the level of the sea is sixty feet.

Reflections.—Population of State in 1870 was 187,748. Of this number, 30,492 were under five years of age; so that out of every 4,356 of the population under five years of age, one died of scarlatina. The weather was warm the month of greatest mortality. As in South Carolina, the majority of the decedents were blacks—*i. e.*, six colored and four whites. I am inclined to the belief, in the absence of any positive information, that the disease is rarely, if ever, epidemic in Florida.

ALABAMA.—Deaths from scarlatina, thirteen; males seven, females six. Of these, nine were under five years of age. The season of greatest mortality was spring. The month of greatest mortality was March. The maximum and minimum temperature, month of greatest mortality, was 62° and 58° Fahr. Average altitude of state above the level of the sea is 375 feet.

Reflections.—Population of State in 1870 was 996,992. Of this number, 156,464 were under five years of age; so that out of every 17,385 of the population under five years of age, one died of scarlatina. All the decedents except four, were white. Epidemics of scarlatina have occurred in the State. Dr. J. Y. Basset, of Huntsville, states: "In the spring of 1833, we were visited by the scarlet fever in its most malignant form. During the prevalence of this epidemic, more than fifty infants perished in Huntsville."*

Dr. F. A. Bates, of Dallas county, remarks: "During my practice in this State, there has been only one epidemic of scarlatina in my neighborhood, and that was in the winter of 1843-44. In its extent it embraced about eighty cases."†

Dr. John P. Furniss, health officer of Selma, in a communication dated April 4, 1875, states, that "there has been only one death from scarlatina within the past five years. Population 3,500 whites; 4,500 blacks."

MISSISSIPPI.—Total deaths from scarlatina, twenty-four; males fourteen, females ten. Of the decedents, sixteen were under five years of age. The season of greatest mortality was summer. The month of greatest mortality, June. Maximum and minimum temperature, 80° and 77° Fahr. Average altitude of the State above the level of the sea, 275 feet.

Reflections.—Population in 1870 was 827,922. Of this number, 137,303 were under five years of age; so that out of every 8,582 of population under five years of age, one died of scarlatina. The weather during the month of greatest mortality was warm. Thirteen, or more than fifty per cent. of the decedents, were colored. I can find no record of any epidemics of scarlatina having prevailed in the State.

LOUISIANA.—Deaths from scarlatina, sixty-eight; males thirty-eight, females thirty. Of these decedents, forty-four were under five years of age. Spring was the season of greatest mortality. April was the month of greatest mortality. The maximum and

*Fenner's Southern Medical Reports, Vol. I., p. 266.

†Fenner's Southern Medical Reports, New York, 1850, p. 313.

minimum temperature of the month of greatest mortality was 72° and 67° Fahr. The average altitude of the State above the level of the sea is seventy-five feet.

Reflections.—Population of State in 1870 was 726,915. Of this number, 110,572, were under five years of age; so that out of every 2,511 of the population under five years of age, one died of scarlatina. The month of greatest mortality was warm. Twenty-three of the decedents were colored. I have no record of any epidemic in this State. In the meantime the disease seems to occur sporadically at New Orleans. In that city, in 1867, there were twenty-four deaths from scarlatina; 1868, fourteen deaths; in 1869, thirteen deaths; in 1870, forty-four deaths; in 1871, there were five deaths; in 1872, three deaths.* At times an increase in the mortality has been noticed. Thus, in 1850, there were twenty-one deaths; while in 1847–8–9, there were 167 deaths from scarlatina.

Dr. Chaille, of New Orleans, in an article on the vital statistics of that city, remarks: "Scarlet fever, total deaths in thirteen years, 1,038. It prevailed chiefly in 1859–60–61–5–6–70, and especially during the four months, April to July."†

TEXAS.—Deaths from scarlatina, 20; males 9, females 11. Of the decedents, 14 were under five years of age. The season of greatest mortality was spring. The average altitude of the State is 450 feet above the level of the sea.

Reflections.—Population in 1870 was 818,579. Of this number, 134,637 were under five years of age; so that out of every 9,617 of the population under five years of age, one died of scarlatina. The season of greatest mortality was warm. All the decedents except four, were whites. I have no record of any epidemics of scarlatina occurring in Texas. In a letter, dated October 30, 1874, Dr. George W. Peete, health officer of Galveston, sends the following statement:

Mortality of Galveston, Texas.

YEAR.	TOTAL MORTALITY.	DEATHS FROM SCARLATINA.
1871.....	683	6
1872.....	676	4
1873.....	658	4
Total.....	2,017	14

It will be noticed how light the mortality from scarlatina is in

*Report of the New Orleans Board of Health to the General Assembly of Louisiana, 1872–73. Dr. S. C. Russell, Health Officer.

†New Orleans Medical and Surgical Journal, July, 1874, p. 20.

this city, having a population of 34,000. Dr. Peete further says: "But one of these cases is reported as malignant scarlet fever, and one as having died of scarlatinal dropsy. I may remark, that all this class of diseases assume here a very modified form, viz: measles, diphtheria, corysipelas, and scarlet fever. The latter disease, too, manifests here an unusual capriciousness in its attacks—often affecting but one or two individuals of a numerous family."

EN RESUME.—Total population in this Southern section was 8,525,289, of whom 3,713,327 were blacks. The total number of deaths from scarlet fever was 553. This mortality was distributed through the following months of the year:

March.....	60	July.....	30	November.....	34
April.....	61	August.....	33	December.....	56
May.....	59	September.....	31	January.....	61
June.....	33	October.....	32	February.....	63
Total.....					553

By seasons, the mortality would then read as follows: Spring, 180; summer, 96; autumn, 97; winter, 180. The month of greatest mortality was February. The seasons of greatest mortality were spring and winter, or in the colder weather. 277 of the decedents were males and 276 females. The seeming influence of altitude on the disease in the South may be studied in the following table:

STATES.	AVERAGE ALTITUDE. FEET.	DEATHS TO THE AGGREGATE POPULATION.	DEATHS TO THE POPULATION UNDER 5 YEARS OF AGE.
Maryland.....	375	1 to 2,360	1 to 512
Virginia.....	700	1 " 28,493	1 " 6,553
North Carolina.....	550	1 " 76,526	1 " 20,409
South Carolina.....	350	1 " 39,200	1 " 9,939
Georgia.....	575	1 " 98,676	1 " 47,351
Florida.....	60	1 " 18,775	1 " 4,356
Alabama.....	375	1 " 76,692	1 " 17,385
Mississippi.....	275	1 " 34,497	1 " 8,582
Louisiana.....	75	1 " 10,690	1 " 2,511
Texas.....	450	1 " 40,929	1 " 9,617

In Texas, Virginia, North Carolina, and Georgia—States having an average altitude of over 400 feet above the level of the sea—one death from scarlatina occurred out of every 48,306 of aggregate population. In the remainder of the Southern States, having an average altitude under 400 feet, one death occurred from scarlatina out of every 9,608 of aggregate population. *In the Southern States altitude seems to diminish the tendency toward scarlatina.*

The total number of blacks dying of scarlet fever in the Southern States was 107, out of a total black population of 3,713,327, so that one out of every 34,704 of the aggregate black population died of scarlatina. The total number of whites dying of scarlet fever was 446, out of a total white population of 4,811,962; so that one out of every 10,790 of aggregate white population died of scarlatina. It will be at once noticed that the disease is *much more frequent among the whites than among the colored population*. During epidemics the whites have seemed to be the sufferers, and there is reason to believe that there is a certain immunity from epidemic scarlatina existing among the negroes of the South.

We now turn our attention to the Western States, commencing with Ohio.

OHIO.—Total deaths from scarlatina, census year of 1870, were 552. Of these, 255 were males, 297 were females; 353 of the decedents were under five years of age. The season of greatest mortality was spring; the month of greatest mortality was March. The maximum and minimum temperature the month of greatest mortality was 45° and 36° Fahr. Average altitude of State above the level of the sea, 700 feet.

Reflections.—Total population in 1870 was 2,665,269. Of this number, 375,412 were under five years of age; so that out of every 1,064 of the population under five years of age, one died of scarlatina. Three only of the decedents were colored. The month of greatest mortality was in cool weather. Epidemics of scarlet fever have occurred from time to time in Ohio. According to the illustrious Dr. Daniel Drake, of Cincinnati,* “A malignant form of scarlatina seems to have invaded the first settlers of Kentucky and Ohio, concerning which, however, but little is now known. Even the exact period can not be stated, but it was between 1791 and 1793. In Kentucky, where it was extremely fatal, it was universally called “putrid sore throat,” as it was probably unattended with much efflorescence. At Marietta and Belpre, the oldest settlements of the State of Ohio, it was most dreadfully destructive among children and young persons. From the time of this epidemic until the year 1808, I do not know that any scarlatina appeared in the valley of the Ohio. In that year cases of the anginose

* Principal Diseases of the Interior Valley of North America. By Daniel Drake, M.D., 1854, p. 594.

variety began to show themselves in Cincinnati, and the disease prevailed more or less for two or three years." Dr. Drake then mentions the following epidemics: Marietta, 1824; Paris, Kentucky, 1821; in southwestern Ohio from 1828 to 1833; Greene county, Ohio, 1838-39-40; Calloway county, Kentucky, 1838. These epidemics have been fully described by Drs. Hildreth, Carroll, Dawson, and Lawrie, and the bibliographical references to the same are given by Dr. Drake. As early as 1822,* Dr. Drake mentions an epidemic of scarlatina that occurred in the West about the year 1810, although he does not speak of this in his book. In addition to these epidemics mentioned by Dr. Drake, I have found references to several others. Dr. George Branch describes an epidemic in Montgomery county, Ohio.† Dr. Judkins speaks of the disease raging as a severe epidemic at Steubenville, in January and March, 1832.‡ Dr. H. G. Carey, of Dayton, says: "Scarlet fever prevailed in Montgomery county, for the first time, in 1831."||

Dr. E. Williams, Barnsville, Belmont county, mentions an epidemic at Belmont in the early part of 1851.§

At Wadsworth, there was an epidemic in November, 1846.¶

Dr. Chas. Cochran describes an epidemic occurring at Toledo, in 1854.**

According to Dr. Silas Reed, scarlatina first appeared in Portage county in December, 1830.††

Dr. Conant describes the disease as it appeared at Windham, in Northeastern Ohio.‡‡

Dr. R. R. Means, of Sandusky, states: "Scarlatina made its first appearance, for the first time in this place, as an epidemic, in 1841."||||

It will be at once seen that the disease is a not unfrequent visitor

* Western Quarterly Journal, Vol. I., p. 308. Cincinnati, September 1, 1822.

† Western Medical Journal, Cincinnati, 1833, p. 371.

‡ Observations on Scarlet Fever, as it appeared at Steubenville. Ib. p. 494.

|| Transactions American Medical Association, Vol. VII., p. 317.

§ Trans. Amer. Med. Association, 1854, p. 353.

¶ American Journal Medical Sciences, 1847, p. 127.

** Cincinnati LANCET AND OBSERVER, Vol. VII, p. 577.

†† Western Journal of Medicine, Cincinnati, 1834, p. 8.

‡‡ Western Journal of Medicine, Vol. XXV, p. 23.

|||| Transactions Ohio State Medical Society, 1857, p. 159.

in Ohio; in the meantime, the scarlatina mortality figures in the principal cities of the State are interesting to the medical statistician.

At Toledo, Lucas County, the deaths from scarlatina, from 1867 to 1873, were as follows :*

YEAR.	DEATHS.
1867.....	1
1868.....	1
1869.....	2
1870.....	86 (Epidemic year,)
1871.....	16
1872.....	1
<hr/>	
Total.....	107

Population of Toledo, in 1870, was 31,584.

At Dayton, Montgomery county, the deaths from scarlet fever, for seven years, ending February 28, 1874, were as follows :

YEAR.	DEATHS.
1868.....	1
1869.....	1
1870.....	24
1871.....	6
1872.....	23
1873.....	11
1874.....	12
<hr/>	
Total.....	78

Population of Dayton, in 1870, was 30,473.†

At Cleveland, in Cuyahoga county, no regular registration of deaths was kept, until September 20, 1873. Through the kindness of Dr. H. W. Kitchen, Health Officer, I have been favored with the following table of mortality from scarlatina for the twelve months ending August, 1874. The population of Cleveland, in 1870, was 92,829. The disease seems to have prevailed as an epidemic in the year 1874:

* Health Reports of Toledo, Ohio, 1868-1873. Dr. S. W. Skinner, Health Officer.

† Seventh Annual Report Board of Health of Dayton, Ohio, 1874, p. 16, Dr. Thomas L. Neal, Health Officer.

MONTHS.		DEATHS.	MONTHS.		DEATHS.
1873.	September.....	3	1874.	March.....	11
	October.....	12		April.....	12
	November.....	10		May.....	8
	December.....	15		June.....	10
1874.	January.....	36		July.....	11
	February.....	12		August.....	6
Total.....		146			

The following table shows the number of deaths registered from scarlatina in this city (Cincinnati, Hamilton county), since the organization of the present board of health, in April, 1867 :

YEAR.	DEATHS.
1867-1868.....	17
1868-1869.....	93 (Small-pox epidemic yr.)
1869-1870.....	13
1871.....	16
Year ending February 29, 1872.....	48
10 months ending December 31, 1872.....	33
1873.....	410 (Cholera epidemic year.)
1874.....	687
Total.....	1,317

Dr. J. J. Quinn, Health Officer of Cincinnati, writing of the year 1873, states : * " No month was exempt from *scarlet fever*, although there were only 15 deaths from the disease during the first four months of the year. Only 1 of these occurred in April. After that, the deaths from scarlet fever increased each month, until there were, from it, 113 deaths in November. 108 died from the same disease in December. The total deaths during the year from this cause were 410."

KENTUCKY.—Total deaths from scarlatina, in 1870, were 80. Males, 42; females, 38. Of the decedents, 61 were under five years of age. Season of greatest mortality, Autumn. No particular month seems to have been marked by any great mortality. The average altitude of the State above the level of the sea is 600 feet.

Reflections.—Total population, 1,321,011. Of these, 209,990 were under five years of age. So that out of every 3,443 of the population under five years of age, one died of scarlatina. Epidemics of scarlatina have occurred in the State at long intervals of time. (Refer to Drake.) 9 of the decedents were colored.

TENNESSEE.—Total deaths from scarlatina, in 1870, were 29. Males, 16; females, 13. Of these, 24 were under five years of age.

* Seventh Annual Report Board of Health of Cincinnati, Ohio, 1873, p. 33.

Season of greatest mortality, spring. Month of greatest mortality, March. Maximum and minimum temperature 55° and 47° Fahr. Average altitude of the State above the level of the sea, 600 feet.

Reflections.—Total population, in 1870, was 1,258,520. Of these, 200,595 were under five years of age. So that out of every 8,359 of the population under five years of age, one died of scarlatina. 4 of the decedents were colored. Epidemics of scarlatina have occurred in Tennessee at times.

Dr. George R. Grant, of Memphis, remarks of scarlet fever, "In Memphis, this disease is seldom met with; and I feel pretty confident that, on full investigation, a similar exception would constitute the rule in other places noted for the prevalence of *malarious* fevers."*

Dr. R. Sneed gives an account of an epidemic occurring at Strawberry Plains, and mentions one at Knoxville.†

Dr. James M. Bell, of Versailles, speaking of an epidemic in that town: "It first made its appearance about the first of January, 1854.‡

It is occasionally seen at Nashville. Under date of October, 1874, Dr. J. W. Morton, Health Officer of Nashville, writes me: "Five deaths from scarlet fever have been reported at this office since its establishment on the first of July last."

WEST VIRGINIA.—Total deaths from scarlatina, in 1870, were 157. Males, 88; females, 69. Of these decedents, 106 were under five years of age. Season of greatest mortality was spring. Month of greatest mortality was March. Temperature, month of greatest mortality, 45° Fahr. Average altitude of the State above the level of the sea, 1,050 feet.

Reflections.—Population of State, in 1870, was 442,014. Of this number, 72,722 were under five years of age. So that out of every 687 of the population under five years of age, one died of scarlatina. 4 of the decedents were colored. Epidemics of scarlatina occur from time to time in West Virginia. Dr. W. P. Ewing, Health Officer of Charlestown, in a communication dated October, 1874, informs me that "there has not, however, been an epidemic, or even a sporadic case of scarlet fever, in Charlestown, since the beginning of the year 1870."

* Trans-American Medical Association, Vol. VII, 1854, p. 97.

† Nashville Journal of Medicine, Vol. VI, p. 211.

‡ Nashville Journal of Medicine, Vol. VIII, p. 367.

38 SCARLET FEVER IN THE UNITED STATES.

Dr. S. L. Jepson, Health Officer of Wheeling, writes me that there were no deaths from scarlatina in Wheeling during the year 1873; but says (October, 1874): "We have a few cases here now, and some rather malignant ones."

MICHIGAN.—Total deaths from scarlatina, in 1870, 707. Males 345; female, 362. Of the decedents, 460 were under five years to age. The season of greatest mortality was spring. The month of greatest mortality was March. The maximum and minimum temperature, month of greatest mortality, was 28° and 22° Fahr. The average altitude of the State above the level of the sea is 800 feet.

Reflections.—Total population of Michigan, in 1870, was 1,184,059. Of this number, 164,202 were under five years of age. So that out of every 357 of the population under five years of age, one died of scarlatina. 6 of the decedents were colored. The weather, month of greatest mortality, was cold. Epidemics of scarlatina have occurred from time to time. Dr. F. K. Bailey, of Lampeer county, mentions an epidemic of scarlatina occurring in the spring of 1844.*

WISCONSIN.—Total deaths, in 1870, from scarlatina, 1,016. Males, 512; females, 504. Of the decedents, 672 were under five years of age. The season of greatest mortality was spring. The month of greatest mortality was March. The maximum and minimum temperature, month of greatest mortality was 34° and 31° Fahr. Average altitude of the State above the level of the sea, 850 feet.

Reflections.—Total population, in 1870, was 1,054,670. Of this number, 157,090, were under five years of age. So that out of every 234 of the population under five years of age, one died of scarlatina. All the decedents were whites. The weather, month of greatest mortality, was cold. Epidemics of scarlatina occur from time to time. At Milwaukee, a slight epidemic tendency was noticeable in 1873. 69 deaths are reported in that year.†

INDIANA.—Total deaths from scarlatina, in 1870, were 353. Males, 190; females, 163. Of the decedents, 235 were under five years of age. The season of greatest mortality was spring. The month of greatest mortality, March. The temperature, month of greatest mortality, averaged about 38° Fahr. The average altitude of the State above the level of the sea is 675 feet.

Reflections.—Population, in 1870, was 1,686,637. Of this num-

* Transactions American Medical Association, Vol. XII. p. 199.

† Seventh Annual Report Board of Health of Milwaukee, 1874, p. 17. Dr. James Johnson, Health Officer.

ber, 253,306 were under five years of age. So that out of every 1,078 of the population under five years of age, one died of scarlatina. All the decedents were white. The weather, month of greatest mortality, was cold.

ILLINOIS.—Total deaths from scarlatina, in 1870, were 2,162. Males, 1,224; females, 1,038. Of the decedents, 1,418 were under five years of age. Season of greatest mortality was spring. Month of greatest mortality was March. Maximum and minimum temperature, month of greatest mortality, 39° and 32° Fahr. Average altitude of the State above the level of the sea, 625 feet.

Reflections.—Population of State, in 1870, was 2,539,891. Of this number, 390,803 were under five years of age. So that out of every 276 of the population under five years of age, one died of scarlatina. The weather, month of greatest mortality, was cold. 11 of the decedents were colored. Epidemics of scarlatina occur from time to time. "According to the mortality reports of 1860, the percentage of deaths in Illinois is 8.80, which is an average of all states." Dr. Hewin, of Iroquois county, reports epidemics in 1864 and 1865.*

At Chicago, in 1870, there were 305 deaths from scarlatina. The great fire, in 1871, destroyed the records of the Chicago Health Office, on October 9. From the *imperfect records* of that year, we notice 124 deaths from scarlatina. There were probably many more deaths from the disease. In 1872, there were 128 deaths from scarlatina. In 1873, there were 115 deaths from the disease.†

Dr. Francis Drude, Health Officer of Quincy, in a communication dated October, 1874, says: "As regards scarlet fever, I have found only 3 cases in the mortuary record—1 on April 26, 1870; 1 on October 16, 1870; 1 on June 11, 1872. I have reason to doubt any of the above cases being genuine scarlatina, since we have not had any epidemic of it for the last fifteen years."

The population of Quincy, in 1870, was 24,052.

At Peoria, there were no deaths from scarlet fever in 1872; only 1 death from the disease in 1873; and no deaths from this cause in 1874.‡

MISSOURI.—Total deaths from scarlatina, in 1870, were 1,049. Males, 524; females, 525. Of the decedents, 728 were under five

* Transactions American Medical Association, Vol. XVIII, p. 179.

† Report of the Board of Health of Chicago, for the years 1870–1873. Dr. Ben C. Miller, Sanitary Superintendent.

‡ Vital Statistics of Peoria, Ill., by Dr. John N. Niglas, Health Officer.

years of age. The season of greatest mortality was winter. The month of greatest mortality was February. The maximum and minimum temperature, the month of greatest mortality was 26° and 17° Fahr. Average altitude of the State above the level of the sea, 800 feet.

Reflections.—Total population, in 1870, was 1,721,295. Of this number, 276,362 were under five years of age. So that out of every 380 of the population under five years of age, one died of scarlatina. 18 of the decedents were colored. The weather, month of greatest mortality, was cold. The deaths at St. Louis from scarlatina, in 1872, were 47; in 1873, there were 22 deaths from the disease.*

ARKANSAS.—Total deaths from scarlatina, 16. Males, 9; females 7. Of the decedents, 13 were under five years of age. Season of greatest mortality, spring. Average altitude of the State above the level of the sea is 300 feet.

Reflections.—Total population, in 1870, was 484,471. Of this number, 82,164 were under five years of age. So that out of every 6,321 of the population under five years of age, one died of scarlatina. All of the decedents were whites. Epidemics of scarlatina occur at times in the State. Dr. George W. Lawrence, of Hot Springs, says: "I know of no other febrile disorder worth mentioning visiting this section, than scarlatina. About the years 1849 and 1850, it appeared in Camden as an epidemic. In many cases, it assumed a malignant form, and was attended with very great fatality. Ten years later, it again made its appearance, but in the simple form, and I do not remember a fatal case of it."†

KANSAS.—Total deaths from scarlatina, in 1870, were 354. Males, 158; females, 196. Of the decedents, 229 were under five years of age. The season of greatest mortality was spring. The month of greatest mortality was May. The maximum and minimum temperature, month of greatest mortality, was 66° and 63° Fahr. The average altitude of the State above the level of the sea is 1,350 feet.

Reflections.—Total population of State, in 1870, was 364,399. Of this number, 59,446 were under five years of age. So that out of every 260 of the population under five years of age, one died of

* Sixth and Seventh Annual Reports Board of Health of St. Louis. Dr. G. F. Dudley, Health Officer.

† Transactions American Medical Association, Vol. XXIII, p. 425.

scarlatina. 18 of the decedents were colored. The weather, month of greatest mortality, was warm.

MINNESOTA.—Total deaths from scarlatina, 238. Males, 129; females, 109. Of the decedents, 143 were under five years of age. The season of greatest mortality was winter. The month of greatest mortality was January. The maximum and minimum temperature, month of greatest mortality, was 13° and 7° Fahr. The average altitude of the State above the level of the sea is 1,100 feet.

Reflections.—Total population, in 1870, was 439,706. Of this number, 70,981 were under five years of age. So that out of every 497 of the population under five years of age, one died of scarlatina. All the decedents were white. The weather, month of greatest mortality, was cold. Epidemics of scarlatina occur from time to time. Dr. Charles N. Hewitt, of Red Wing, says: "Twice epidemics, during the past year, in St. Paul; very mild, and few deaths. Also at Stillwater, where 22 cases are reported in Dr. Reiner's practice, none fatal. In Red Wing, it began in September, and still continues at the same time with rubeola. There have been over 300 cases, and very few deaths."*

IOWA.—Total deaths from scarlatina, in 1870, were 325. Males, 156; females, 169. Of the decedents, 228 were under five years of age. The season of greatest mortality was spring. The month of greatest mortality was April. The maximum and minimum temperature, month of greatest mortality, was 56° and 46° Fahr. The average altitude of the State above the level of the sea is 900 feet.

Reflections.—Total population of State, in 1870, was 1,191,702. Of this number, 190,701 were under five years of age. So that out of every 837 of the population under five years of age, one died of scarlatina. 2 of the decedents were colored. The weather, month of greatest mortality, was cool.

NEBRASKA.—Total deaths from scarlatina, 90. Males, 40; females, 50. Of the decedents, 57 were under five years of age. Season of greatest mortality was spring. Month of greatest mortality was March. Maximum and minimum temperature, month of greatest mortality, 33° and 36° Fahr. Average altitude of the State above the level of the sea is, 1,700 feet.

Reflections.—Total population in the State, in 1870, was 122,993.

* Transactions American Medical Association, 1872, p. 464.

Of this number, 19,508 were under five years of age. So that out of every 343 of the population under five years of age, one died of scarlatina. All the decedents were white. The weather, month of greatest mortality, was cool.

NEVADA.—Total deaths from scarlatina, in 1870, were 141. Males, 72; females, 69. Of the decedents, 109 were under five years of age. The season of greatest mortality was winter. The month of greatest mortality was January. Average altitude of the State above the level of the sea, 5,400 feet.

Reflections.—Total population of State, in 1870, was 42,491. Of this number, 3,297 were under five years of age. So that out of every 31 of the population under five years of age, one died of scarlatina. All the decedents were white. The weather, month of greatest mortality, was cold. The aggregate of deaths from all causes, in this State, was 615. From this, it will be seen that *scarlatina was the principal cause of death.*

OREGON.—Total deaths from scarlatina, 16. Males, 12; females, 4. Of the decedents, 12 were under five years of age. The season of greatest mortality was winter. The month of greatest mortality was January. The maximum and minimum temperature, the month of greatest mortality, was 48° and 31° Fahr. The average altitude of the State above the level of the sea is 2,000 feet.

Reflections.—Total population of State, in 1870, was 90,923. Of this number, 13,808 were under five years of age. So that out of every 1,151 of the population under five years of age, one died of scarlatina. All the decedents were white. The weather, month of greatest mortality, was cool.

CALIFORNIA.—Total deaths from scarlatina, 479. Males, 253; females, 226. Of the decedents, 307 were under five years of age. Summer was the season of greatest mortality. June was the month of greatest mortality. The maximum and minimum temperature, the month of greatest mortality, was 56° and 87° Fahr. The average altitude of the State above the level of the sea is 2,500 feet.

Reflections.—Total population of the State, in 1870, was 560,244. Of this number, 68,277 were under five years of age. So that out of every 223 of the population under five years of age, one died of scarlatina. None of the decedents were colored. 2, however, were Chinese. The weather, month of greatest mortality, was warm. Epidemics of scarlatina occur from time to time in the State. At San Francisco, the mortality from scarlatina, for some years back, is as follows:

YEAR.	DEATHS FROM SCARLATINA.
1867-1868.....	13
1868-1869	194
1869-1870.....	157
1870-1871.....	62
1871-1872.....	15
1872-1873.....	33
1873-1874.....	387
Total.....	861

Says Dr. Henry Gibbons, Jr. :* "Isolated cases of scarlatina had occurred from time to time, since the epidemic in 1869-1870; but the mortality had diminished to 15 in 1871-1872, and to 23 in the first eleven months of the fiscal year 1872-1873. The disease then took a new departure, 10 deaths occurring in June, 1873, 14 in July, 15 in August, 26 in September, 43 in October, 59 in November, and 81 in December, when the acme was reached. In January, a rapid diminution to 47 deaths took place, and in subsequent months a remarkable rise and fall in the mortality was observed—as follows: February, 16; March, 31; April, 15; May, 24; June, 16; July, 27. In a large proportion of the cases, physicians, in their certificates of death, described the disease as malignant. Entire families of children were, in several instances, carried off by it; and, in at least one block, a dozen deaths occurred. Two-thirds of the decedents were under five years of age; only 30 exceeded ten years; while 2 were between thirty and forty years old. A singular feature was the preponderance of females over males, the former being ten per cent. in excess."

EN RESUME.—Total deaths from scarlatina, in the western section of the United States, in the census year of 1870, were 7,764. Males, 3,925; females, 3,839. This mortality was distributed through the following months:

MONTH.	DEATHS.	MONTH.	DEATHS.
March	1,095	September.....	377
April.....	823	October.....	441
May.....	748	November.....	533
June.....	472	December.....	628
July.....	445	January.....	816
August.....	457	February.....	929
Total.....			7,764

* Report of the Health Officer of the City and County of San Francisco, June, 1874, p. 16.

The mortality at the different seasons was as follows: spring, 2,666 deaths; summer, 1,374; autumn, 1,351; winter, 2,373. Almost two-thirds of the entire mortality from scarlatina was, then, in *cold weather*—in the spring and winter months. The season of greatest mortality was spring. The month of greatest mortality was March.

The seeming influence of altitude on the disease may be seen, if the following table be carefully looked at. The mortality in Nevada, having an average altitude of 5,400 feet, is especially noticeable.

STATES.	AVERAGE ALTITUDE. FEET.	DEATHS TO THE POPULATION UNDER 5 YEARS OF AGE.	DEATHS TO THE AGGREGATE POPULATION.
Ohio.....	700	1 to 1,064	1 to 4,829
Kentucky.....	600	1 " 3,443	1 " 16,513
Tennessee.....	600	1 " 8,359	1 " 43,398
West Virginia.....	1,050	1 " 687	1 " 2,816
Michigan.....	800	1 " 357	1 " 1,675
Wisconsin.....	850	1 " 234	1 " 1,039
Indiana.....	675	1 " 1,078	1 " 4,779
Illinois.....	625	1 " 276	1 " 1,175
Missouri.....	800	1 " 380	1 " 1,641
Arkansas.....	300	1 " 6,321	1 " 30,280
Kansas.....	1,350	1 " 260	1 " 1,030
Minnesota.....	1,100	1 " 497	1 " 1,848
Iowa.....	900	1 " 837	1 " 3,667
Nebraska.....	1,700	1 " 343	1 " 1,367
Nevada.....	5,400	1 " 31	1 " 302
Oregon.....	2,000	1 " 1,151	1 " 5,683
California.....	2,500	1 " 223	1 " 1,170

It will be noticed that in Arkansas, having an average altitude of 300 feet, only 1 death occurred to every 30,280 of aggregate population; while, in Ohio, Kentucky, Tennessee, Michigan, Wisconsin, Indiana, Illinois, Missouri, and Iowa, states having average altitudes ranging from 600 to 900 feet, 1 death from scarlatina occurred to every 2,317 of aggregate population, the total aggregate population of the last-named states being 14,533,153, and the total number of decedents from scarlatina, 6,273. In West Virginia, Kansas, Minnesota, Nebraska, Nevada, Oregon, and California, states having average altitudes ranging from 1,050 to 5,400 feet, 1 death from scarlatina occurred to every 1,447 of the aggregate population, the total aggregate population in these states being 2,133,316, and the decedents from scarlatina numbering 1,475. The following proposition can then be made regarding these states:

Altitude in the Western States seems to increase the tendency to scarlatina.

GENERAL RECAPITULATION.—The total number of deaths from scarlatina occurring in the census year of 1870, including those not heretofore enumerated belonging to the various territories, were 20,320. Males, 10,299; females, 10,021. The mortality was distributed according to sex through the following months (refer to pages 208 and 209 of Ninth Census, volume Vital Statistics):

MONTH.	MALES.	FEMALES.
January.....	1,099	1,106
February.....	1,234	1,159
March.....	1,401	1,325
April.....	1,162	1,132
May.....	1,083	1,063
June.....	634	692
July.....	614	602
August.....	574	522
September.....	441	486
October.....	508	492
November.....	675	606
December.....	872	833
Unknown.....	2	3
Total.....	10,299	10,021

The month of March presents the largest showing of deaths, in any one month, of males. The month of March also presents the largest showing of deaths, in any one month, of females. The aggregate of deaths by months is as follows:

January.....	2,205	August.....	1,096
February.....	2,393	September.....	927
March.....	2,726	October.....	1,000
April.....	2,294	November.....	1,281
May.....	2,146	December.....	1,705
June.....	1,326	Unknown.....	5
July.....	1,216		
Total.....			20,320

The deaths, by seasons, may be arranged as follows:

Spring.....	7,166
Summer.....	3,638
Autumn.....	3,208
Winter.....	6,303
Unknown.....	5
Total.....	20,320

Spring was the season of greatest mortality, and autumn the season of least mortality. *Almost two-thirds of the deaths occurred*

in the colder seasons of the year. According to the eighth census, 1860, page 267: "In winter, scarlet fever did 33.88 per cent. of its work, and in spring, 27.85 per cent. The destruction in summer was but half, and in autumn less than two-thirds, of that in winter. March was its most fatal month; January, February, and April nearly the same. In July and August, the mortality was but about half of that of those months; and in the other warm months—June, September, and October—it was in somewhat larger proportions." It is at once noticeable that the conclusions to be drawn from the figures of the census of 1860 coincide almost exactly with those of 1870. In other words, the *colder weather seemed to favorize the scarlatinous tendency.* There seems to be a variance on one point between the scarlatina statistics of Europe and the United States. Thomas, in his superb monograph on scarlatina, page 194, remarks that "the most complete reports concerning the influence of *season* on the prevalence of scarlatina have emanated from England. The greater prevalence of the disease in the fall of the year has been recognized since Sydenham's time. During spring, its decrease is not so decided as in other diseases which prevail with like frequency during this time. Of 55,956 deaths in London from scarlatina, within twenty-four years (up to 1863 inclusive), 17.87 per cent. occurred during spring, 22.75 per cent. during summer, 35.54 per cent. during the fall, and 23.85 per cent. in winter (the latter comprises the last four months of the old and first nine weeks of the new year. In other words, the largest number of deaths from scarlatina occurred between the middle of September and the middle of November; the smallest number, toward the end of March and beginning of April. The greatest number of deaths, however, in the fall of the year were certainly not caused by a greater malignancy of the disease at this season. Similar results are obtained by calculating the deaths which have occurred in all England, according to the different seasons of the year. Other but much smaller data, in our own country (Germany), also indicate the influence of the fall of the year on the spread of scarlatina. . . . The reports of epidemics do not show an aggravation of the disease under the influence of a changeable cold, and moist *weather.* Of course, scarlatina has often prevailed during such weather, but it has not been absent under opposite conditions; and in England especially, it has attained a wide spread during warm weather. The condition of the weather can

therefore be said to exert but moderate influence on the frequency of scarlatina." The census figures of 1860 and 1870, in the United States, show that scarlatina is a disease belonging to the *colder seasons*, and that spring and winter exhibit the greatest mortality from the disease, although there can be no doubt but that slight epidemics sometimes occur in *summer*, but the latter form *rare exceptions, and not the rule*, in this country. The following instances, where late epidemics of scarlatina, in the United States, seemed to have been influenced by temperature, are not without interest. It will be noticed that the mean monthly temperature of the various cities, as given by Blodget, is used; also that the health-office mortality statistics of the different cities spoken of are the mortality figures used.

In Baltimore, January, 1872, to January, 1874:

MONTH.	DEATHS, 1872.	DEATHS, 1873.	MEAN TEMPERATURE. DEGREES.
January	18	7	30.9
February	13	5	33.
March.....	11	12	39.2
April.....	10	12	52.1
May	13	15	60.6
June	3	10	70.9
July	3	9	75.2
August.....	7	5	74.7
September	19	5	66.6
October.....	12	4	54.9
November	13	7	44.3
December	19	24	34.4
Total.....	141	115	

In 1874, the disease seems to have increased; but again July, the month of highest temperature, shows the least mortality from the disease. The figures are up to October, 1874, the month the last health report was issued. It will be noticed that a mean average monthly temperature, varying from 70° to 75° Fahr., seems to have diminished the mortality from the disease, when either a *slight epidemic tendency* prevailed, or the disease manifested itself in a mild form.

In Chicago, January, 1872, to January, 1874:

MONTH.	DEATHS, 1872.	DEATHS, 1873.	MEAN TEMPERATURE. DEGREES.
January	21	14	23.6
February	15	7	24.7
March.....	11	14	32.3

MONTH.	DEATHS, 1872.	DEATHS, 1873.	MEAN TEMPERATURE. DEGREES.
April.....	14	13	46.1
May.....	15	11	56.3
June.....	6	11	62.7
July.....	9	15	70.8
August.....	8	8	68.5
September.....	4	10	60.1
October.....	8	4	48.5
November.....	10	4	37.9
December.....	22	4	29.3
Total.....	143	115	

A *very slight epidemic tendency* is here noticeable, disappearing in October, 1873. The largest number of deaths occurred in winter and spring, the *colder seasons*. It will be noticed, however, in July, a month having an average temperature of 70° Fahr., that, in 1873, there was a very slight increase, followed by a decided decrease in the next hot month of August. The two *warmer seasons*, again, in this case, show that their seeming influence is to diminish the mortality from the disease.

San Francisco, 1873-74, epidemic commencing June, 1873:

MONTH.	DEATHS, 1873-74.	AVERAGE MEAN TEMPERATURE. DEGREES.
1873. June.....	10	58.6
July.....	14	59.8
August.....	15	60.9
September.....	26	61.5
October.....	43	61.7
November.....	59	57.
December.....	81	51.5
1874. January.....	47	50.1
February.....	16	52.9
March.....	31	54.5
April.....	15	58.6
May.....	24	57.8
Total.....	381	

It will be noticed that in June, July, August, September, October, and April, the six months having the highest temperature, the least mortality occurred; while, in the other six *cooler months*, *more than two-thirds of the mortality occurred*. When the last San Francisco health report was issued, the epidemic seemed not to have yet died out, for there were 16 deaths in June, 1874, and 27 in the following warm month of July.

In Providence, R. I., in 1873:

MONTH.	DEATHS SCARLATINA.	MEAN TEM- PERATURE, DEGREE.
January.....	8	27.5
February.....	6	26.9
March.....	5	34.7
April.....	6	44
May.....	10	55.2
June.....	11	64.9
July.....	10	70.6
August.....	12	68.7
September.....	17	60.9
October.....	9	50.3
November.....	15	39.8
December.....	23	29.8
Total.....	132	

Here is an instance where the mortality was greater in the *warm* than in the colder seasons. The month of greatest mortality, however, was a winter month (December). The highest mean monthly temperature prevailed in July, and is about 70° Fahr. The following table shows the deaths from scarlatina by weeks, and the temperature record during the same period. This epidemic of 1873-74 occurred in this city (Cincinnati). The mortality figures were furnished me by Mr. Bart Chapman, clerk of the Board of Health. The thermometrical observations are those furnished by the United States Signal Service Office. The observations commenced in August, 1873.

DEATHS FROM SCARLATINA, WEEK ENDING—	DEATHS OF SCARLATINA.	AVERAGE OF TEM- PERATURE SAME PERIOD, DEGREES.
August 16.....	2	75
“ 23.....	5	75
“ 30.....	5	76
September 6.....	7	76
“ 13.....	5	69
“ 20.....	3	64
“ 27.....	8	64
October 4.....	18	63
“ 11.....	12	56
“ 18.....	15	60
“ 25.....	36	48
November 1.....	19	44
“ 8.....	26	48
“ 15.....	31	41
“ 22.....	23	38
“ 29.....	29	38
December 6.....	20	43
“ 13.....	13	48
“ 20.....	24	41
“ 27.....	28	34
“ 31.....	25	29
Total deaths.....	354	

The influence of a *high temperature* in August seems to have checked

the epidemic tendency; with the falling temperature of autumn, there was a revival of the tendency, and the disease again raged as an epidemic. In 1874, the following condition of affairs existed:

DEATHS FROM SCARLATINA, WEEK ENDING—	DEATHS.	AVERAGE OF TEM- PERATURE SAME PERIOD, DEGREES.
January 3.....	12	51
“ 10.....	26	36
“ 17.....	18	24.14
“ 24.....	23	44
“ 31.....	28	39.86
February 7.....	28	34
“ 14.....	19	41
“ 21.....	20	44
“ 28.....	20	36
March 7.....	19	48
“ 14.....	20	35
“ 21.....	10	52
“ 28.....	20	43
April 4.....	11	41
“ 11.....	12	44
“ 18.....	20	52
“ 25.....	16	52
May 2.....	16	57
“ 9.....	10	60
“ 16.....	16	73.57
“ 23.....	7	60.71
“ 30.....	14	76.29
June 6.....	17	76.86
“ 13.....	11	79.85
“ 20.....	6	77.57
“ 27.....	12	82.43
July 4.....	11	81.29
“ 11.....	13	82.43
“ 18.....	10	78.43
“ 25.....	8	79
August 1.....	17	75.86
“ 8.....	6	75.57
“ 15.....	15	81
“ 22.....	16	80.29
“ 29.....	6	73
September 5.....	10	76
“ 12.....	7	77
“ 19.....	8	73
“ 26.....	8	67
October 3.....	13	61
“ 10.....	10	57.50
“ 17.....	10	52.03
“ 24.....	10	58.86
“ 31.....	13	58.04
November 7.....	5	51.71
“ 14.....	9	50.78
“ 21.....	11	45.43
“ 28.....	9	39.68
December 5.....	3	40.12
“ 12.....	9	37.38
“ 19.....	8	39.07
“ 26.....	9	40.57
“ 31.....	2	38.91
Total deaths, 1874.....	687	

If this table be carefully analyzed and studied, it will be noticed that a high temperature seemed to lessen the mortality from the disease. This epidemic commenced to decline in November and December, 1874, after having destroyed over 1,000 persons, all, with four or five exceptions, under 20 years of age, and the majority of them young children. Calculating the mortality to have been ten per cent., there must have been over 10,000 persons attacked by the disease. Notwithstanding it is claimed by *authorities* on the subject that *scarlatina is not modified by temperature*, I have been led to a contrary conclusion. A study, from this special point of view, of numerous statistics, not included in this paper, has led me to believe that various changes, produced by temperature, serve to influence the disease, and that these changes were brought about only by a very *high temperature*.

The following propositions *may stand*—or fall, if the requisite proof to the contrary be given:

1. *The scarlatinous tendency is but slightly, if at all, modified by a temperature ranging from zero to 65° Fahr.*
2. *The scarlatinous tendency is decidedly modified and lessened by a temperature ranging from 75° to 80° Fahr.*
3. *The scarlatinous tendency is almost entirely destroyed where there is a prolonged high temperature ranging from 80° to 85° Fahr.*

INFLUENCE OF AGE.—The period of life at which the disease seems to react most fatally is shown by the following tables:

Deaths in 1860.

AGE.	MALES.	FEMALES.	TOTAL.
Under 1 year.....	1,435	1,166	2,601
1 to 2 years.....	1,804	1,639	3,443
2 to 3 ".....	2,053	1,833	3,886
3 to 4 ".....	1,754	1,703	3,457
4 to 5 ".....	1,415	1,342	2,757
Total under 5 years.	8,461	7,683	16,144
5 to 10 years.....	3,428	3,721	7,149
10 to 15 ".....	750	973	1,723
15 to 20 ".....	287	383	670
20 to 25 ".....	81	133	214
25 to 30 ".....	51	93	144
30 to 40 ".....	54	88	142
40 to 50 ".....	38	38	76
50 to 60 ".....	29	29	58
60 to 70 ".....	21	18	39
70 to 80 ".....	8	9	17
80 to 90 ".....	3	4	7
Over 90 ".....	1	0	1
Unknown.....	9	9	18
Grand total.....	13,221	13,181	26,402

It will be seen that 25,686 of the decedents were under 20 years of age. That the ages of 634 ranged from 20 to 60 years of age, while 64 of the decedents were over 60 years of age. From 2 to 3 years of age, the mortality seems to be greatest. The majority of the decedents were under five years of age.

Deaths in 1870.

AGE.	MALES.	FEMALES.	TOTAL.
Under 1 year.....	1,173	927	2,100
1 year	1,552	1,415	2,967
2 years.....	1,679	1,583	3,262
3 "	1,514	1,416	2,930
4 "	1,201	1,095	2,296
Total under 5 years.	7,119	6,436	13,555
5 to 10 years.....	2,377	2,472	4,849
10 to 15 "	484	656	1,140
15 to 20 "	142	192	334
20 to 25 "	67	95	162
25 to 30 "	31	61	92
30 to 35 "	11	22	33
35 to 40 "	16	21	37
40 to 45 "	14	15	29
45 to 50 "	11	7	18
50 to 55 "	3	9	12
55 to 60 "	4	10	14
Over 60 "	14	19	33
Unknown.....	6	6	12
Gand total.....	10,299	10,021	20,320

It will be noticed that the majority of decedents were under 5 years of age. At 2 years of age, the mortality seems to be greatest. 33 of the decedents were 60 years and over. A careful study of these tables, as well as of other tables, not here included, serves to convince me that age influences, to a great degree, the mortality from scarlatina. A prognosis in cases of scarlatina may be partially based on the age of the patient.

At 2 years of age, the disease is most fatal. The greatest mortality is among children under 5 years of age. From the fifth to the tenth year, the mortality steadily decreases up to the twentieth year, after which time the susceptibility to the scarlatinous poison seems not to be great. From the age of puberty, and during the child-bearing period, up to the age of 45 or 50, there seems to be *an excess of deaths from scarlatina among females*, as compared to males; and this constitutes too strongly a marked feature to pass unnoticed, for it will be remembered that the male population in 1860 and in 1870 outnumbered the female population. After the child-bearing period, this tendency seems to subside. I have noticed the same

fact in studying European scarlatina statistics—notably those of Great Britain. *In other respects, sex does not seem to influence the mortality from the disease.*

INFLUENCE OF RACE AND NATIONALITY.—The following table shows the nationality of the decedents from scarlatina in 1870 :

United States—Whites	19,099
Indians	11
Colored.....	289
Unknown.....	9
Germany.....	245
Norway, Sweden, and Denmark.....	70
Ireland.....	173
England and Wales.....	180
Scotland.....	28
France.....	8
North of Europe.....	30
Italy.....	1
South of Europe.....	15
China and Japan.....	3
All others.....	159
Total.....	20,320

Foreign-born population, in 1870, was 5,567,229, and 1 out of every 6,105 of these died of scarlatina. Colored population, 4,880,009; 1 out of every 16.886 died of the disease. Native-born white population, 28,120,788; 1 out of every 1.473 died of the disease. We can therefore safely conclude that *scarlatina attacks by preference the white population, the colored population appearing to be but slightly predisposed to the disease.* The census figures of 1850 will make a like showing. Tullock's English Reports confirm the same fact. The relation of nationality to the scarlet-fever mortality is thus stated by that most eminent of American statisticians, Francis A. Walker, M.A.* After giving a table, the writer remarks :

“Now, since 103 deaths in each 1,000, from scarlet fever, to take an instance from the above table, occur under the age of one year, and as but .005 of the population within that period of life are of foreign birth, it will follow, if we assume no more than an equal liability to this disease on the part of this element of the population, that of these 103 deaths, but .515 (fractions being preserved throughout this computation) occur among the foreign children. As 146 deaths additional in each 1,000, occur between the

*Transactions American Public Health Association, Vol. I, p. 29. New York, 1875.

ages of 1 and 2, and as but .01 of the total population within this period are of foreign birth, it would follow that of these 146 deaths, but 1.46 occur among the foreign children. In the same, we should find that of the 161 deaths from this cause between the ages of 2 and 3, but 2.415; of the 144 deaths between 3 and 4, but 2.88; of the 113 deaths between 4 and 5, but 2.938; of the 239 deaths between 5 and 10, but 8.604; of the 56 deaths between 10 and 15, but 2.408; and of the 16 deaths between 15 and 20, but 1.312 occur among the population of foreign birth, making the proportionate share of the foreign population in the 978 deaths enumerated out of each 1,000 from this disease, but 22.532.

"If we assume the mortality among this element of the population from this cause to be 30 per cent. greater than that of the native population, the contribution of foreign children to the 978 deaths which occur under 20 years out of each 1,000 deaths at all ages, from scarlet fever, would still be but 29.6, leaving even at this extreme assumption, out of each 1,000 deaths from this cause, among all classes, not less than 15.4 deaths among the foreign population above 20 years of age. But as only 22 deaths in each 1,000 from this cause occur above 20 years of age, among all classes of the population, and as the foreign element constitutes but 24.6 per cent. of the total population above 20, it would follow that their proportional share of this latter body of deaths would be but 5.412. Hence we must conclude either that the mortality among the foreign population from this cause under 20 years, must be greater than that of the native population by much more than the 30 per cent. assumed, or else that the mortality from this cause among the adult foreign population is excessive in a most extraordinary degree."

We now, in conclusion, turn to the seeming effect of altitude on the disease.

Altitude.—Scarlatina prevails at all altitudes, epidemics occurring at New York, Providence, and Boston, on the Atlantic coast; at Pittsburg, Cincinnati, Chicago, Detroit, and St. Louis, in the interior of the continent; finally, among the mountains of Nevada, and at San Francisco on the Pacific slope. In order to determine whether altitude seems to modify or lessen the tendency to scarlatina, we shall group the States as follows: 1st group. States having average altitudes ranging from 50 to 600 feet, are Tennessee, Vermont, Kentucky, Georgia, North Carolina, Texas, Massachusetts, Maine, Maryland, Alabama, South Carolina, Arkansas, Connecti-

cut, Mississippi, New Jersey, Rhode Island, Delaware, Louisiana, and Florida. Total population of this group, in 1870, was 14,597,384. 2d group. States having average altitudes ranging from 600 to 1,000 feet: Iowa, Wisconsin, Missouri, Michigan, New York, Pennsylvania, Ohio, Virginia, Indiana, Illinois, and New Hampshire. Total population of this group, in 1870, was 21,506,599. 3d group. States having average altitudes ranging from 1,000 to 5,400 feet: Nevada, California, Oregon, Nebraska, Kansas, Minnesota, and West Virginia. Total population of this group, in 1870, was 2,133,316. In these three groups of States, 20,159 deaths from scarlatina occurred—*i. e.*, 3,333 in the first, 15,351 in the second, and 1,475 in the third. If we now analyze these figures, the following is the result:

ALTITUDE.	DEATHS.
150 to 600 feet.....	1 death to every 4,380 of population.
600 to 1,000 "	1 " " " 1,401 " "
1,000 to 5,400 "	1 " " " 1,447 " "

Now, taking into consideration the density of population in the second group as compared to the third, together with the fact that scarlatina, being a contagious disease, should be more prevalent where it has the largest and densest population to prey on, we conclude that *altitude rather favors an increase of the scarlatinous tendency*. In the meantime, it is but fair to state that in the first group we have Rhode Island, Connecticut, Massachusetts, and New Jersey, *the four most densely populated States in the Union*.

Having now treated briefly of the seeming influences exercised by geographical position, season, temperature, race, nationality, sex, and altitude on the disease, we close, merely adding that our *conclusions* are, in many instances, strengthened by statistics not included in this short paper, and are not the result of any preconceived theories.

